NAVAL POSTGRADUATE SCHOOL
Monterey, California

THESIS

OPTIMUM ADP SUPPORT FOR FINANCIAL MANAGEMENT
OF MARINE CORPS FACILITIES MAINTENANCE

by

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June 1983

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER	2. GOVT ACCESSION NO. / 3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle): Optimum ADP Support for Financial Management of Marine Corps Facilities Maintenance	5. TYPE OF REPORT & PERIOD COVERED: Master's Thesis, June, 1983 / 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s): Floyd D. Braaten	8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS: Naval Postgraduate School, Monterey, California 93940	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS: Naval Postgraduate School, Monterey, California 93940	12. REPORT DATE: June, 1983 / 13. NUMBER OF PAGES: 141
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)	15. SECURITY CLASS. (of this report): UNCLASSIFIED / 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Facilities, maintenance, department, ADP, support, financial, management, system

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

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S/N 0102-LF-014-6601

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

Abstract (Continued) Block # 20

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Optimum ADP Support for Financial Management of Marine Corps Facilities Maintenance

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Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN INFORMATION SYSTEMS

from the

NAVAL POSTGRADUATE SCHOOL
June 1983

ABSTRACT

This thesis examines the internal information management needs of a Marine Corps Facilities Maintenance Department. The processing of information, and its associated work flow and reports, is discussed. The Facilities Maintenance Department is viewed as a Fund Administrator and the information flow is tied to fiscal management. The conclusion reached is that current processes are heavily dependent on manual systems. These manual systems are considered inadequate for efficient management of funds and work progress. Trend information and historical data is difficult to retrieve and managerial feedback is incomplete and untimely. Recommendations are made for modernizing these systems using internal ADP support and interfacing the internal system with Marine Corps-wide systems such as SABRS.

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I. INTRODUCTION

In recent years, maintenance of facilities has been an area of increasing interest at all levels of budgetary control. Station operating funds are reflecting larger dollar amounts for this purpose. Marine Corps Operations and Maintenance (O&M,MC) appropriations have contained a growing maintenance floor figure for the upkeep of real property--from $37,500,000 in FY 1973 to $197,000,000 at the beginning of FY 1983 [Ref. 1], [Ref. 2], [Ref. 3]. Congressional concern in this area is implicit in these growing appropriations. It is also a matter of explicit record as pointed questions are prompted by the growing Backlog of Maintenance and Repair (BMAR) in Department of Defense (DOD):

> Despite Congressional direction some years ago to contain the backlog of maintenance and repair (BMAR) at the $2,300,000,000 level, the projected backlog for fiscal year 1983 is $3,331,000,000. Although the backlog has been steadily decreasing over the last three years, this has primarily resulted from Congressional action. [Ref. 4 : p. 68]

The Facility Maintenance Department is the operational entity of a base that repairs and maintains real property facilities. It is a significant fund administrator (FA) responsible for managing a significant share of a station's funds. The fiscal connection would seem obvious: the repair of a leaking roof is soon translated into dollar-and-cent figures for material and labor. Yet, this fiscal connection seems to have been strangley overlooked outside the specific comptroller arena.

The construction of new, easier to maintain facilities is a slow, piecemeal process. The norm for a Marine Corps station is to keep older, deteriorating facilities in good

repair, as these facilities comprise the bulk of the structures available. The impact has been growing complexity and workload within the Facility Maintenance Department which is matched by increasing high echelon attention and pressure to reduce--or at least stabilize--a growing BMAR.

Like other Federal agencies, the Marine Corps is pursuing enhanced computer support to accommodate the growing complexity of its operations. Much of this effort is being directed toward large scale, high-level systems with Marine Corps-wide impact. The Joint Uniform Military Pay System (JUMPS) and Supported Activities Supply System (SASSY) are past examples of such systems. Under current development are the Marine Corps Standard Supply System (M3S) and Standard Accounting, Budgeting and Reporting System (SABRS). Because of its sweeping fiscal management impact, SABRS is of particular interest to fund administrators such as the Facility Maintenance Officer. (SABRS will be discussed periodically in this study. For a short overview of the system see Appendix A). SABRS does in fact intend to provide managerial assistance to the FA level. However, it fails to provide all the necessary internal fiscal management needed by an FA. The need for this internal capability, in fact, forms much of the impetus for this study. To quote some of the replies from a questionnaire [Ref. 5] sent out at the early stages of this study:

> a. Automated procedures are critically needed to control supply/material stock authorized...IAW MCO 4400.15b. Manual records are currently maintained.
>
> b. Consider PRIME support to be timely and helpful with regard to accounting functions. Its function as a source of management information is severly lacking.
>
> c. With the quantity and the diversity of "small business" type hardware on the market today, surely there must be an easier method of obtaining minicomputer support short of trying to always consolidate with a single larger system that serves <u>all</u> needs.

SABRS will enhance the flow of data into the overall fiscal system and will give the FA feedback on his status. It will not help accumulate the data internally to feed the system. The Facility Maintenance Officer, like so many FA's, is using essentially the same manual procedures and files that have been used for twenty years or more [Ref. 5]. As complexity and pressure mount, the internal scheduling, prioritizing, report generation and record keeping are assuming immense proportions. Hildebrand presents a synopsis of the problem when he states:

> Before an intelligent decision can be made about the degree of maintenance required for any given area or equipment, a maintenance manager must supply current, accurate data, such as hours operated, maintenance costs, and... priority.
>
> From these basic requirements have evolved some basic data collecting systems. At inception, most systems involve some sort of work card which combines hours, machines, and materials. This, followed by considerable manual posting, yields some cost data.
>
> However, manual systems are handicapped by slow reaction time, clerical costs, and lack of detail. Because these systems tend to be either too general or too limited in scope, a maintenance manager is continually bothered by detail and worry about pertinant information being overlooked [Ref. 6 : p. viii].

Impetus to correct these problems is placed on the Marine Corps as the Secretary of Defense's guidance to the military services in developing the fiscal year 1984 budget submission states [Ref. 4] :

> Defense components must reverse the decline of the condition of their facilities by committing adequate resources and management attention. Strategies and programs must be developed and implemented that achieve steady improvement through 1988....(p. 69).

One resource to be considered in this endeavor is the Automatic Data Processing (ADP) function. The computer has tremendous potential for assisting the FA's which are the

ultimate resting places of Marine Corps funds. Their efficient operation would have direct impact on overall Marine Corps fiscal efficiency.

Because of its size and high visibility, the Facilities Maintenance Department has been singled out for focused study. However, it is quite possible that the underlying issues of fund administration and streamlined fiscal management would be found to apply to other FA's such as Base Motor Transport or Messhall operations.

This study will attempt to analyze the internal workings of a typical Facilities Maintenance Department and identify the information management requirements. It will then examine some alternative methods to enhance the managerial functions. The study is intended to fulfill the first step in a classic systems development cycle: identification of the problem and exploration of general techniques to show the feasibility of better methods.

II. FACILITIES MAINTENANCE ORGANIZATION

A. A "GENERIC" FACILITIES MAINTENANCE DEPARTMENT

It is impossible to describe a typical Facilities Maintenance Department and accurately reflect every one in the Marine Corps. The unique requirements and characteristics of each station necessitate a certain amount of local "tailoring" in each organization. However, a basic structure can be delineated which represents the general arrangements found in each. MCO P11000.7_ [Ref. 7] outlines a "typical" base facilities maintenance structure. The organization wire diagrams found in Appendix B are taken from that publication with some slight modifications reflecting information gained during this study. The unique station deviations from this basic structure are usually minor variations on the theme for the express purpose of addressing a local need.

It should also be noted that this basic structure, as discussed in this study, pertains primarily to the Marine Corps ground stations vice air stations. The Marine Corps air stations are patterned after the facilities maintenance organization of the U.S. Navy. This is due in part to the amount of Naval funding of Marine Corps air facilities. The Navy is responsible for maintaining air-unique facilities such as navigational aids and these constitute a large part of Marine Corps air stations. Nevertheless, it can generally be said that the internal concerns of facilities management are the same, regardless of the type of station.

As can be seen from Figure B.1, the Facilities Maintenance Officer is one of several facilities support personnel who answer to the Director, Facilities Management. This Director is frequently found in the base G-4 section.

Some stations commonly give the Facilities Maintenance Officer cognizance over some of the other functions shown, notably, Family Housing Manager and Natural Resources and Environmental Affairs Officer. This study will concentrate on a Facilities Maintenance Department which exists as a separate entity and reflects the organization of the figures in Appendix B.

Figure B.2 depicts the way the Department is usually divided into four distinct divisions. Each division has separate, but overlapping functions which are mutually supportive. (Later chapters will explain the internal workings of these Divisions in greater detail as their managerial needs are examined.) The diversity of tasks found in the Facilities Maintenance Department is particularly apparant through examination of Figure B.6, the Maintenance and Repair Division. Control, accounting, and paper flow within each Division, and between separate Divisions, is a complex arrangement. At the current time it is one marked by manual and generally antiquated processing.

In developing the idea of a generic Facilities Maintenance Department for ground stations it is necessary to differentiate between "major" and "minor" activities. Appendix A2 of MCO P11000.7_ [Ref. 7] (reproduced as Appendix C of this study) lists all Marine Corps stations and their official designation of "major" or "minor" for facilities maintenance purposes. The designation corresponds to the size of the station, in terms of real property account maintained, and the corresponding staff size of the Facilities Maintenance Department. Besides being a general size indicator, the designation of "major" or "minor" also reflects the local funding approval authority for certain projects. An example of a major activity would be MCB Camp Pendleton while one of a minor activity would be Camp Elmore. The majority of Marine Corps ground stations, and

vitually all of the air stations, are classified as major activities.

B. INTERNAL DEPARTMENT STRUCTURE

This generic organization provides a springboard for examining the managerial concerns of the Facilities Maintenance Department. A description of the general tasks of each Division with some comments on the respective fiscal impacts, will lend focus to the topic under study.

1. Administrative Division

As the name implies, this Division (see Figure B.3) is responsible for matters pertaining to office management. This work includes "personnel administration; office services; routing correspondence; maintaining records; and coordinating budget estimates, workflow, and reports". [Ref. 7 : p. 2-5] In this Division resides the Department's Fiscal Branch, usually under the Statistics Unit. This Branch provides the interface between the Comptroller and the Department as budgets are formulated. It also monitors the progress of expenditures and general fund status and provides other normal accounting information for the Department's use. It is here the broad base of the internal fiscal data comes to a point. This is the most likely future location of the Department's SABRS terminal so that system can be fed the appropriate data, and where the Facility Maintenance Officer would go to receive information on current fiscal status. This Branch is also where final labor data is accumulated and entered into the accounting systems.

The Personnel Unit looks after normal personnel administrative matters--primarily in conjunction with civilian labor. An important function is to accumulate such information as accrued leave, leave expended, promotion and

pay scale data, etc., and ensure that this is information is accurately reported to the fiscal personnel.

The Office Services Unit tends to the internal flow of paperwork and associated procedures including mail processing, filing and routing. This Unit also carries out the Administrative Division Head's responsibilities associated with employee relations, union problems and Equal Employment Opportunity matters. Position management, such as Table of Organization changes or position descriptions are another concern of this Unit. Finally, this Unit takes care of Supply and Organizational Property matters. As a point of interest, supply accounting has assumed such major proportions that some large installations have formed a separate Supply/Organizational Property Unit in the Administrative Division.

2. Operations Division

This Division (see Figure B.4) can be viewed as a buffer between the Maintenance and Repair Division and the outside world. Its tasks are as described in MCO P11000.7_

> The Operations Division is responsible for developing long-range maintenance plans; annual and quarterly work programs; screening and classifying all work requests, including emergency and service-type work; inspecting real property; preparing master weekly work schedules, hours and materials estimates for job orders; determining the need for engineering advice and assistance; and requesting the Public Works Officer to arrange for contractual services. The Operations Division is also responsible for recommending work accomplishment by contract when a facility project exceeds the activity commander's approval authority or when the scope of the work exceeds in-house capability. [Ref. 7 : p. 2-5].

The fiscal impacts of this Division are quite involved and numerous. The budget is largely affected by the labor and material estimates which result from activities such as facility inspections and work request processing. The unfunded portions of these deficiencies

ultimately are reflected in the BMAR figure which appears before Congress. After budgeting, the scheduling of work and processing of requests directly impacts the expense side of the fiscal processes.

Work enters the Department by written request or, if an emergency, by phone. The Work Reception and Control Unit receives these work requests and processes them based on criteria tied to the corrective effort they require. This will be discussed in greater detail in later chapters.

The Plans and Programs Unit includes a staff of Inspectors. It maintains a Long Range Maintenance Plan (LRMP) covering a 5-year period and a one-year Short Range Maintenance Plan (SRMP). Based on these, facility inspections are conducted and necessary work is identified. These plans are consistent with the station's Master Facilities Plan which encompasses all aspects of facility use and potential replacements. The Inspectors of this Unit are not involved in the inspection of finished work for quality. Rather, they exist to hold periodic inspections of all station facilities. Ideally, they are staffed to allow inspection of every facility at least annually. The goal is to identify "actual or anticipated specific maintenance or repair" [Ref. 7] of each facility. Again, this has a direct impact of the BMAR and on eventual expense of funds. The Plans and Programs Unit uses the Inspectors' reports to establish part of the long range and short term planning for the Department. They also ensure plans are consistent with the station's Master Facilities Plan.

The Planning and Estimating Unit prepares the labor and material estimates for jobs identified by the Inspectors or by work requests from other activities aboard base. A large part of this unit's work is dedicated to project estimates which directly affect initial work costing.

The Scheduling Unit passes work received along to the Maintenance and Repair Division. This unit actually matches each job with the correct work unit and personnel at the correct time in order to properly handle priorities and workload.

A Contracts Unit is a relatively recent addition to the Operations Division. Its addition has been prompted by the growing role and complexity of contract administration. Service contracts especially are being used more often for long standing requirements. The administration of these and other types of contracts has necessitated a centralized resident expertise.

3. Maintenance and Repair Division

The personnel usually associated with Facilities Maintenance--the ones who do the physical maintenance and repair tasks on a given facility--are located in this Division. As stated in MCO P11000.7_:

> This division is responsible for maintaining, repairing, and constructing real property and providing janitorial, refuse collection and disposal, and entomological services. The division also provides maintenance, other than operator's maintenance, for utility systems, Government-owned internal wire communication systems, and fire alarm systems. Additionally, this division provides maintenance, repair, and fabrication services for personal property. [Ref. 7 : p. 2-6].

Figure B.6 gives an overview of the myriad of tasks which this Division must coordinate and respond to. Obviously, the bulk of material and labor expense data originates in this Division as the assorted jobs are scheduled and accomplished.

The Shop Planners are responsible for inter-Divisional planning. They may also assist in Work Center planning. They coordinate the material and equipment for each job and try to ensure balanced workloads for each Work Center.

The Work Centers contain the tradesmen and craft specialties needed to conduct facility maintenance. These are the ultimate resting places for work passed on from the Operations Division. The Emergency Work Center has a cross-section of tradesmen representing the most common trades usually involved in emergency work; e.g. plumbers, electricians, carpenters. The quantity and mix is tailored to the station. They handle "emergency" designated work involving less than 16 hours estimated completion time. The Craft Work Centers contain tradesmen grouped by specific craft. They are involved in the more routine or longer duration jobs. They may also be used to augment the Emergency Work Center.

From a fiscal view, a crucial aspect of this Division is the accumulation of material and labor costs. These must be accounted for by job so each job represents an accurate cost. The aggregate job data must support the generalized accounting of all labor costs and material costs as these are broken out under their respective summations.

A final note about work centers: many installations, because of their wide geographic dispersion, have implemented a system of area work centers. These are located at the various camps and facility centers throughout the base. For instance, a large base like Camp Pendleton has seven of these work centers in places like the Regional Medical Center and the Horno area which are distantly removed from the main Facilities Maintenance locale or have frequent unique demands for service. These work centers are primarily oriented toward quick emergency and service responses of a small nature. They are staffed with a representative cross-section of various tradesmen and can be augmented as needed from the Maintenance and Repair Division which still acts in a supervisory role just as it does for the other work centers.

4. Utilities Division

Again, as stated in MCO P11000.7_:

> The Utilities Division is responsible for the efficient operation and operator's maintenance of the activity's utilities systems. This responsibility includes the operation of nonautomated plants, periodic inspection of automated plants and distribution systems, maintaining and evaluating operational records, evaluating performance reports, coordinating the scheduling of maintenance and overhaul work, ensuring sufficient supplies of fuels and materials, managing the utilities conservation program, establishing and maintaining utilities targets, furnishing of quantity data for budgeting and accounting and the planning for future utilities support requirements. [Ref. 7 : p. 2-7].

During the course of operations, the Maintenance and Repair Division may task tradesmen of the various Work Centers to assist the Utilities Division in repair and maintenance of the utility systems. The major goal of the Utilities Division is to "increase production efficiency, reduce distribution losses, eliminate usage waste and attain the procurement of utilities at a minimum cost". [Ref. 7] Figure B.5 depicts this Division which is organized into self-explanatory system groupings.

In this day of energy consciousness, this Division is the one most likely to strike a respondent chord with the station Comptroller. A great deal of attention is directed toward energy usage. With the constant fluctuation of fuel and energy prices, budgeting for utility usage is becoming an increasingly difficult endeavor. The precise accounting for every cent spent on utilities and the reconciliation with private industry billing is a carefully monitored process. Of the four Divisions within the Department, this is the one most likely to reflect at least some automated sophistication. However, the fiscal accounting for energy costs is still an essentially manual process conducted in the Administrative Division.

III. WORK REQUEST PROCESSING AND RESULTANT INFORMATION

Fiscal and managerial information takes many forms and stems from many sources within the FA's department. At the root of the Facility Maintenance effort lie the various types of maintenance and repair jobs. These are the basic entities that start a series of chain reactions which eventually convert jobs to fiscal data. In order to examine the process, a "typical" job will be traced through the Department in a representative scenario. At each step of the processing, the information generated, the report channels affected and the work accomplished as a result of this job will be examined. The emphasis will be on how such processing is accomplished in the "generic" department of Chapter II. The techniques used are typical throughout the Marine Corps as verified by a questionnaire sampling [Ref. 5]. Appendix D contains examples of some of the various forms discussed in this and the next chapter as the Department's workload is developed.

Before developing this scenario, it is necessary to explain the types of work requests processed by Facilities Maintenance. Work can be generated as a result of an inspector's report after a routine facilities inspection; as a standing job order which covers continual maintenance requirements (such as grass cutting or janitorial work) or involves emergency or service work; or as a request for work received from some source outside the Department. Some basic criteria pertaining to the above is as follows:

1. Emergency Work: this is assigned to specific work centers and involves less than 16 hours of work. An example would be a leaking pipe. The plumbing shop would repair only the leak. If investigation revealed

that an entire section of plumbing should be replaced, the amount of work exceeding 16 hours would become part of a specific job order and placed into normal planning/prioritization (called scheduling).

2. Service Work: this involves not more than two work centers, 16 hours or less labor and not more than $400 to complete. Again, any excess is carried on a specific job order.
3. Specific Job Order: this results from a work request involving over 16 hours work. These are subject to regular scheduling.
4. Work requests are also received which involve only the issue of small amounts of material for jobs such as those in the self-help program.

Work enters the Department in the form of a work request on form NAVFAC 9-11014/20 (see Figure D.1) or by telephone. Telephone entry is reserved for emergency work only. For the purpose of the study, a NAVFAC 9-11014/20 has been received to repair the window sills on a barracks, Building #333. The sills are old and warped and are no longer keeping out the affects of the weather. The NAVFAC 9-11014/20 has been received by the Work Reception and Control Unit as of 1200 on 10 January 1983. This is a representative job requiring over 16 hours and routine processing. Chapter IV will examine the unique aspects of other job types listed above along with other informational considerations which require study.

As a final note, at each phase of the scenario process, estimates on the time for each processing step will be addressed. These are subjective estimates based on interviews with the appropriate personnel at the Facilities Maintenance Department of MCB Camp Pendleton. The estimates are included solely as representative information which will serve as the basis for comparative analysis later in this

study. While they are considered reasonable, especially in light of the experience level of the personnel providing them, actual times will vary from station to station.

A. JOB ENTRY

The Administrative Division receives the work request in the guardmail and routes it to the Work Reception and Control Unit of the Operations Division. This Unit reviews the request document for administrative accuracy to ensure that it contains the necessary information, authorized signatures, etc. The request is logged in, using a manual pending file consisting of a card index. This records the job description, arrival time/date, approval/disapproval data and when/where it is sent during each step of the processing. In this way, pending jobs can be traced through the course of their processing. The card index is an awkward method requiring the appropriate card to be pulled every time a work request moves. Because of the sheer volume of jobs, only the most recent ones (those currently in processing) are easily retrieved. Older work requests which may be held at various locations (discussed later in this and following Chapters) are harder to locate on this card file. As a result, subsequent enquiries into the status of an older job may require a half-hour or more research through the card index.

Since it has not been identified as one which has some unique high-level attention, this work request is initially approved for further processing by the head of the Work Reception and Control Division. If it had been one needing special handling, the Operations Officer and the Facilities Maintenance Officer would have had personal involvement, possibly in conjunction with the Base Facilities Director. If the project had been disapproved, it would have been returned to the requesting organization with an explanation.

Approval includes the assignment of a priority evaluation. This is based on internal policy designed to identify high priority projects such as those involving safety or energy conservation. It also takes into account the requestor's priority considerations.

All approved projects are given a preliminary screening by the Plans and Programs (P&P) Supervisor. They are checked against other plans (such as the station's Master Facilities Plan) and ongoing projects to ensure no conflicts exist. A low priority project is retained by P&P. There it is filed until the backlog of higher priorities is cleared sufficiently to allow it to be processed. P&P involvement in facilities maintenance is actually quite involved and far-reaching. It will be discussed in more detail in Chapter IV.

Since the window sill project involves energy conservation considerations, it is given a higher priority rating and is forwarded to the Planning and Estimating (P&E) Unit for the next step in processing. The pending-file notes the new location and status. Generally, it arrives at P&E approximately 24 hours after initial reception at the Work Reception and Control Unit. At this point, the job exists as a NAVFAC 9-11014/20 and as pending-file entries. It should be noted that a large installation such as MCB Camp Pendleton processes eight to nine thousand of these work requests per year. [Ref. 9]

B. PLANNING AND ESTIMATING

At P&E, projects are assigned to estimators in priority sequence. The estimator has experience in a specific trade; i.e. plumbing, carpentry, electrical, etc. A large project which would involve more than one work center is broken down with a Phased Worksheet and each estimator deals with the phase unique to his area of expertise. The Phased Worksheet

also reflects the chronological phases needed for a job. For example, a concrete job may require carpenter work first, to build forms, followed by concrete pouring. Each phase is estimated separately.

The window sill repair job involves only one craft: carpentry. If it had originated with the Department Inspectors, the work request would have included a detailed inspection write-up. Since it did not, the estimator performs an on-site inspection and prepares a Job Order (JO) form. At this point, duplicated work requests would normally become apparant for the first time. If the window sills had already been repaired on another work request, that fact is usually noted by someone remembering such work already done or by the on-site inspection. Because the pending-file card index system is so awkward, efficient referral to old jobs is not always possible. If duplication is noted or remembered, the facility history file is checked for old work requests to find out when the first one was done.

The JO represents the first step the work request takes in its transition to fiscal data. Using the DOD Engineering Performance Standards (EPS), the estimator prepares a labor estimate for the work. Then a materials estimate is prepared. For material costs, the estimator turns to the base Shop Stores Catalog first. If the items are not there, a voluminous collection of vendor catalogs or phone contacts are used. After estimating the materials needed, a Bill of Materials (BOM) is prepared which will later be used by the Administrative Division's Supply personnel.

In their present version, the EPS are found in a collection of a dozen three- ring binders, each one-half to two inches thick. The estimator looks through these for the standards for each kind of job. The EPS is maintained by the Naval Facilities Engineering Command (NAVFACENGCOM) for DOD. They are subject to constant review and updating. [Ref. 8]

A sample page is included as Figure D.2. Each aspect of a job has a related EPS labor estimate.

Material estimates are based on experience and general trade engineering criteria. They are figured for each item of material for the job--from paint to nails--using estimator work sheets and desktop calculators.

This JO has taken eight manhours to prepare--including on-site review and desktop workup (these and other labor times for general processing of a work request are charged against Department overhead rather than the job itself). At this time, it reflects an estimated cost in labor and material. This JO is now referred to as a Specific Job Order as differentiated from Emergency/Service jobs which require less than 16 hours labor. It is now reviewed by the P&E Supervisor, who checks it for accuracy, and it is sent to the Operations Officer for review. [Ref. 10]

C. OPERATIONS

Upon arrival at the Operations Officer's desk, the pending-file is updated showing the JO location. The Operations Officer reviews the JO, noting first the total estimated costs. If under a certain amount (at this installation, $2500) and of a routine nature, the Operations Officer approves it and authorizes material to be ordered. The window sill job has been estimated to cost $3500. Therefore, since it exceeds $2500, it is forwarded to the Facilities Maintenance Officer for approval. The pending-file is again updated to reflect its current status. Routine JO's usually are batched and sent to the Facilities Maintenance Officer two or three times a day. They come back the next day. High priority jobs, regardless of cost, also go to the Facility Maintenance Officer since these could require the Work Centers to halt some lower priority job in

crder to do this work. Sensitive jobs are hand carried for promptness.

The routine windcw sill job is approved and sent back to the Cperations Officer. Its status is entered in the pending-file card index and it is sent to the Administrative Division's Fiscal Branch where it receives a Jcb Order Number (JCN) and general accounting data.

D. FISCAL

The Fiscal Branch is part of the Statistics Unit of the Administrative Division. Here, the Specific JO first begins to interface with the accounting and budgeting systems.

The JO receives a unique JON which then becomes its primary identifier in the fiscal system. It also receives an internal control number to help in tracking its progress. The control number has data indicating the type cf work involved (i.e. repair, maintenance, construction) and the type of funds, by functional category, to be used as a result (e.g. "M-1" fcr repair and maintenance).

The JO receives coded data indicating its functional category code (FCC), its cost account code (CAC), and its element of expense (EE). The FCC designates what function the expense will support: i.e. is it an Administrative cost; for mission operations; supply operations; etc. The CAC provides more detail in regards to the actual end use of the purchased resources, in particular, the type of facility they will be applied to. The EE describes the actual resources that are to used; i.e., civilian labor, military labor, supplies, etc. [Ref. 11] For the window sill project, the code would show M-1 (the FCC for repair), 7170 (the CAC for a barracks), and U (the EE for civilian labor).

This JO also receives a work generator (or labor class) code, and a work center code (WCC). The WCC gives the unique code of the actual work center doing the job. The Work Generator Code is used only for JO's authorizing tasks for the Maintenance and Repair Division personnel. This code identifies productive labor (e.g., emergency work, service work, job order work) and overhead labor (e.g., administrative and clerical work, supervision, etc.) which is expended by this Division directly on this job. Because it is a Specific JO, the window sill job's labor class code is 05. Its WCC is 40 for Building Trades Unit. These codes provide a numerical method of using automated systems to gather data about specific JON's [Ref. 7].

These codes are manually entered on the JO form. It is then returned to the Operations Unit. After being signed, a copy comes back to Fiscal to be loaded into the Facility Maintenance Management Report (FMMR) System which is discussed in Chapter VIII. The data is typed in on a "Scandata" terminal which is used to provide input to the PRIME accounting system. The Base Comptroller Office also receives a copy which prompts it to enter the JON and its accompanying data into the general accounting portion of the PRIME system. (The PRIME system will be discussed in more detail in Chapter VI). Processing at the Fiscal Branch takes "a few minutes" to enter the codes on the JO and to manually enter the data into a log book which records all JON's. [Ref. 12]

E. BACK TO OPERATIONS

When the JO is received back at Operations (usually the next day after being sent to fiscal), it is forwarded to the Scheduler. The pending-file card index again is updated. The job is then entered on a large status board recording JON,

project description, status (hold, ready, working), whether material is ordered and when, etc. At this time material is ordered for the job and it is put in a hold status until material receipt. The Scheduler uses a quarterly schedule to determine the most likely date when the job can be scheduled based on the potential availability of shop labor. He then assigns a Required Delivery Date (RDD) and sends the BOM to the Department's Supply Branch.

F. MATERIAL ORDERING

Material is ordered with the BOM prepared by P&E. The BOM is comprised of several sheets of paper, one sheet for each item being ordered. The window sill project would have a sheet for lumber, one for nails, one for caulking, and one for paint. Each sheet has the JON and the item description needed.

At Supply, the BOM receives a document number and a file is opened for the JO. A document date is entered, usually one a few days in the future to allow for processing time lags, and the BOM is sent to the main base supply system.

The BOM is received first at Shop Stores where an inventory of certain items is held. It is processed there to see what items can be filled out of that inventory. In this case, Shop Stores has the nails and caulking but not the lumber and paint. These unfilled items are sent to the Direct Support Stock Control (DSSC) center where they find their way to the Tech and Research Department. At this point, the items are researched and a decision made to order material from within the Federal supply system (e.g. GSA catalog) or through open purchase with a commercial vendor.

The installation supply department enters the JON into the PRIME system. There it exists as an open job order and funds are committed for the purchase of the material. The

funds are not actually expended against the JON until the bills have cleared the Comptroller for payment. When expensed, the PRIME entries are made against the JON by the base acccunting office.

As the material fcr a job is received, it is delivered to the station Shop Stores. Each item is identified with its specific JO using the document numbers of the BOM and the JON. Shop Stores forwards a Receipt of Materials nctice to the Facility Maintenance Department's Supply office. As each of these is received, the supply clerk circles the applicable document number in that JO's file. When notice of the final item is entered, a receipt is forwarded to Scheduling notifying that Unit cf material availability. This receipt contains the date, JCN, the date the BOM was completed and the Required Delivery Date (RDD) which had been established for delivery. This is usually forwarded to Scheduling the same day it is received. [Ref. 13]

G. BACK TO SCHEDULING

Upon notice that all materials are available, Scheduling notifies the Shop which will be involved in the job. That Shop sends someone to Shop Stores with a copy of the BOM. The materials are inventoried. Quantity and type/quality needed are verified. If the type or quality is not correct, an effort is made through the supply system to exchange the materials fcr the prcper ones. If this is not possible, or if other problems are encountered it may be necessary to prepare a new BOM for the unacceptable items and return it through the supply processing as in the original BOM.

Once all material has been verified, the status board is changed to reflect that the job is in a "ready" state. The Scheduler has a quarterly schedule showing the jobs pending that are planned for work during the next three months. As

these are worked, new ones are added. Others may be "slipped" back until labor can be scheduled. Once a week, the Scheduler provides the Shop Planners with the jobs needing work using rough lists prepared off the status board and informal discussion. This is done based on priority and information that the Scheduler has concerning the available labor hours of each shop: information which can be determined from the currently working job load at each shop. By Thursday the next week, the jobs to be done for the upcoming week (starting the next Monday) have been identified. An ongoing exchange of information has occured in the interim between the Scheduler and the Shop Planners to arrive at this point.

On Thursday afternoon, the Scheduler holds a weekly planning meeting. Present are the head of Operations, head of the Maintenance and Repair Division, and each of the Shop Planners. The Scheduler addresses each job which has been tentatively identified as being part of the upcoming week's schedule. Each shop which has labor involved verifies that the job can be handled that week with the available labor. If a given job should require labor from more than one shop, Scheduling will have assigned a "lead shop": usually the one with the most labor involved. This shop's planner will address the number of labor hours and the dates they are required from the other shops in order for work to progress in the necessary phases. In this way, the week's jobs are verified and final adjustments or work substitutions are made.

After manual processing, discussion and negotiation, a schedule is worked out for the upcoming week beginning the Monday after the meeting. The window sill job has now been back at the Scheduler, with materials on hand, for two weeks before being scheduled. The Scheduler now prepares a Master/Day Schedule (commonly called a "long form") (Figure

D.3) for each shop. This shows the upcoming week's JO's assigned to that shop. A master schedule for the entire Department is also prepared showing which shops are working each JO at a given time and date. The Scheduler files the work request form in the Scheduling office. The JO form and the "long form" are passed to the Shop Planners and the pending-file card index is updated. The paperwork involved requires a weekly effort of two to three hours. The weekly planning meetings require an additional one or two hours per attendee.

If a higher priority job can not be scheduled during a certain week because of labor constraints, a lower priority one may be scheduled in order to keep a certain shop's personnel from being idle. The high priority job would then be reconsidered the following week. [Ref. 14], [Ref. 15]

H. MAINTENANCE AND REPAIR

At Maintenance and Repair (M&R), the JO is filed in the Division's main office as a working job. A copy is passed to the applicable Shop Planner along with the "long form". The "long form" is used to keep a running total of the material and labor expended on the job for the week. For jobs involving more than one shop, the lead shop has the additional responsibility of coordinating with the other shops and ensuring accurate collection of the job data.

Each shop has an individual designated as a "materials expediter". This person's first job, upon receipt of a newly scheduled JO, is to draw the "preparation materials" which will be needed as soon as a work crew starts work. These materials are drawn from Shop Stores one or two days before actual commencement of work. They are moved to the Facility Maintenance Department's lot and are ready for the work crew to transport to the work site as needed. After this initial

issue, the leader of the work crew notifies the material expediter as more materials are needed. For the window sills project, the nails and lumber for the first few days are drawn.

On Monday morning, the initial materials are loaded and work begins. It is possible that the work crew leader may notice a needed change in work scope as the job progresses. For instance, the window sills project may require a glass crew because of the number of broken windows. Hopefully, this had been noticed early while P&E was conducting the on-site inspection. However, the nature of some jobs precludes such knowledge until work begins.

If work scope changes, the shop that notes the changed requirements must prepare a JO amendment for another shop. If it is a minor amendment, an effort to amend the other shop's schedule and to quickly secure materials will be made. A large amendment may cause the JO to be returned to Scheduling. There it reenters a hold state waiting materials or a ready state waiting for affected shops to schedule labor. It could even require a new P&E effort.

As work progresses, material is drawn until depleted and the job is finished. For fiscal purposes, at this stage material has been issued, funds obligated and invoices are being processed to expense the items. This has been recorded in the PRIME sytem. The Shop's concern with material amounts for the JO is simply to draw that which has been ordered, use it on the job and later report any excesses.

Labor is accumulated daily as the work crew leader fills out the labor timecards at the end of each work day. These are 3" X 6" computer cards filled out manually. They reflect the labor hours expended and the JON they apply to. These are turned in to the Shop timekeeper. The Shop Planner enters the labor breakdown on the "long form" showing the labor for each JO.

On Monday of each week, the Shop timekeeper takes all the timecards for the preceeding week and goes to the Fiscal office. There the timekeeper keys the data onto the Department's Scandata terminal. This enters the labor into the PRIME system where it is recorded against the JON. The PRIME system generates a monthly labor report and a periodic Master Job Order Number (MJON) report (the actual schedules for these reports may vary depending on the base Accounting Department's requirements). The labor report shows total labor expended by each FA. The periodic MJON report shows closed and outstanding JON's with the materials (entered by supply and Comptroller personnel) and labor (entered by the shop timekeepers) attributed to that JON.

When the job has been finished--i.e., all the window sills have been repaired in Building #333--the JO is closed out by the Shop Planner. The documents pertaining to the job are returned to the Scheduler with the totals in labor and material expended against the job. [Ref. 15]

I. BACK TO SCHEDULING

At Scheduling, the actual labor and materials used for the job are compared to the estimated amounts originally prepared by P&E. Initially, only labor can be checked as it is reported on the "long form" in terms of actual labor used. Material simply shows as the amount ordered and assigned to the JO when received at Shop Stores. Sixty to ninety days after Fiscal reports a job closeout, the FMMR system will generate a Report #3 showing actual materials and labor as compared to the amounts estimated. The Scheduler uses the Report #3 to note variances plus or minus 10 per cent. These prompt a variance report to a monthly meeting of the variance review committee. This committee is composed of the head of the Maintenance and Repair Division,

the head of P&E and the Facilities Maintenance Officer. The committee attempts to clarify the reasons for the variances and whether managerial actions should be taken to preclude their recurrence. If a labor estimate is judged to have resulted from faulty EPS estimates, this fact is reported to NAVFACENGCOM and is considered during the ongoing EPS review and update process.

The JO is closed out by Scheduling and sent back to the Department's Fiscal Branch. A copy is retained in Scheduling and the original work request, together with the JO form, is sent to P&P. There the documents are entered into Building #333's facility history file. Once each month, a "Completed Job Order" list is sent by Scheduling to Base Cost Accounting. There PRIME system entries are made recording JO closure.

J. BACK TO FISCAL

As the work was progressing, Fiscal was receiving periodic MJON reports showing it as an open JON. Materials and labor were being charged to this JON from the processing previously discussed. The closed JO is now checked against the MJON reports to reconcile totals. Once the last material bill is paid, the MJON should show the JON with final figures as a closed JO. Fiscal then sends notice to the Work Reception and Control Unit of the final closeout. The appropriate index card which has tracked this work request in the pending-file is pulled and placed in a closed file.

K. BACK TO SUPPLY

If excess materials are left from the job, Supply Branch is notified by Scheduling. Minor items with high usage, such as nails, nuts, bolts, caulking, etc., may be retained at Facilities Maintenance for future use as needed. More

significant items are returned to the Base Supply personnel. If they go to Shop Stores, a credit is issued to the Department against the Facilities Maintenance O&M funds. If the credit occurred in the same fiscal year as the original JON, the credit will be reflected against that JON in the subsequent material accounting of the PRIME system. This information may not always find its way back to the facility history file. If fiscal years have changed, a new JON may be used to return the material. Generally, these excess materials do not cause a reduction of the final material costs reflected against a specific JO. This often results in inflated final JO costs, the magnitude depending on the original materials estimate. If purchased through the Federal Supply system, an effort is made by supply to return it. If an open purchase item, it is sent to the Defense Property Disposal Office and the US Treasury generally receives any funds generated from the material's final disposition.

L. SUMMARY

This Chapter has followed a work request of a type that makes up a large part of the Facilities Maintenance Department's workload. This type of request by no means represents all the work and information processing of the Department as following chapters will discuss. The intent has been to show the complicated and time consuming methods used in many Marine Corps Facilities Maintenance Departments.

It should be noted that, excluding supply lead times and job performance time (factors largely independent of internal Department processing), it still requires approximatly 26 days for a job to be processed as shown in Table I. Most of the labor involved in these times is direct

TABLE I

Work Request Processing Times

Work Reception to P&E	1 day
P&E Work	1 day
P&E to Operations to Fac. Maint. Officer	1 day
Fac. Maint. Officer to Operations to Fiscal	1 day
Fiscal to Operations	1 day
Operations to Scheduling	1/2 day
Scheduling to Supply	1/2 day
Supply to System Entry (material is ordered and delivery leadtimes are incurred)	3 days
Supply to Scheduling	1/2 day
Scheduling to Maint. & Repair Division (work progresses to completion)	14 days
Maint. & Repair to Scheduling	1 day
Scheduling to Fiscal	1 day
total:	25 1/2 days

Department overhead. This table reflects an optimistic situation where a job is never detained because of higher priorities or other problems. It also does not reflect the manhours incurred when several people are involved in a specific step or the time consuming aspects of simply finding and pulling the card from the pending-file at each step.

The processing described in this Chapter obviously involves a great deal of manual handling. Automated methods could help reduce some of this, although some would still be necessary. There are also many instances where information tracking and retrieval would be greatly assisted through automation. Of particular concern are the disjointed methods of charging costs to JO's and the time lags built into the reporting systems. Timely Department fiscal status is difficult to attain and its accuracy suspect until final close-outs. These topics will be further addressed in later Chapters when other informational needs, and some recommendations toward fulfilling them, will be discussed.

IV. PLANS AND PROGRAMS UNIT

The Department's P&P Unit and its inspectors were mentioned in Chapter III as being one source of the work requests entering the Department. The role of this Unit is actually much more far-reaching and involved than the occasional generation of a work request. This Unit has a central role in consolidating and forecasting the installation's facility maintenance needs.

The primary "Maintenance Policy" established by MCO P11000.7_ [Ref. 7 : p. 3-3] states:

> The basic work unit for Marine Corps facilities maintenance organizations is the specific job order which is:
>
> a. Identified by a continuous inspection program
>
> b. Generated by a long-range maintenance plan
>
> c. Estimated, utilizing EPS's
>
> d. Master scheduled

Any "other work" (i.e. emergency/service or customer-generated) is to be fully justified on a "cost-effectiveness" basis.

While this policy may not accurately reflect the "real world" of facilities maintenance, its intention is a valid one and is at the root of the long range planning and inspection program: it "facilitates control and feedback". [Ref. 7]

A. INSPECTIONS AND THE BMAR

MCO P11000.7_ requires an annual inspection of each facility. The inspector visits each facility armed with knowledge of its age, life expectancy, and possibly some

reported repair trends. A detailed inspection of the facility is held and includes interviews with the local occupants. An inspection report is then generated to the P&P Supervisor. If certain aspects require prompt attention--such as the need for new window sills--the inspector may be directed to prepare a work request for P&E. Otherwise, the results of these inspections find their way into the Long Range Maintenance Plan (LRMP). This is a five-year plan predicting the upcoming maintenance work for the station. It has a direct fiscal impact and enters into the budget process which will be discussed in Chapter VI. It is the LRMP which provides some of the basic data concerning how much maintenance money will be required in the outyears. From this plan evolves the Short Range Maintenance Plan (SRMP) - known usually as the "one-year plan".

The SRMP outlines what should be done in a given fiscal year in order to properly maintain the base facilites. A roof identified in FY78 as approaching its life-expectancy in FY83 would appear in the FY83 SRMP. It should be noted that facilities, and facility components, have established life-expectancies based on the engineer standards associated with their material, construction type, weather factors, etc. It is therefore relatively easy to identify a roof that should be resurfaced before it begins to leak. As a result, the Maintenance Policy is intended to preclude constant reaction to events that have already occurred by providing a means of preventing them in the first place. This is supposed to be a natural result of the inspection and planning process. Theoretically, if all worked as intended, work requests from outside the Department would be only for rare emergencies or new construction. All the repair and maintenance work would come from the LRMP by way of the SRMP and the inspectors.

Unfortunately, this is not a "real world" situation. Inspectors frequently cannot keep up with the inspection schedule and may, in their rush, miss some work that needs to be done. In addition, past funding levels were insufficient to accomplish all the work identified on the SRMP. When these factors were added to the growing age of the plant account, repair and maintenance requirements gradually got ahead of the ability to schedule and fund them in a given year. As a natural result, only pressing work of a high priority--e.g. the roof that actually was leaking--began to dominate the weekly and quarterly schedules and this situation continues. There simply are not enough resources left for the roof that soon might leak. [Ref. 16] Congress has endeavored to correct this problem with the growing maintenance floor allocations mentioned in Chapter I but the BMAR has continued to grow at a rate faster than funding can arrest.

The situation today is that much of the BMAR rests in the SRMP projects. The Department expends so many resources--labor and funds--reacting to high priorities and emergency work that the SRMP projects actually accomplished are very few. Those left over each fiscal year fuel the growing BMAR.

B. P&P PROCESSING

All projects entering the Facilities Maintenance Department pass over the P&P Supervisor's desk. As noted in Chapter III, they are given a preliminary screening for redundancy with other projects aboard the base. The P&P Unit maintains lists of known contract work--both in-house and from Public Works--as well as other future projects. Some of these may be contained on the station's Master Facilities Plan, a copy of which is provided by Public Works. The work

requests being screened may be for work that is already included in these efforts.

The P&P Unit also maintains a huge manual file of projects with low priority which have not been scheduled. Any information concerning these projects must result from manual screening. For example, a question such as "how much money is needed for roof repairs next year" would necessitate a manual lookup and calculator exercise. If Scheduling requires a project to fill in because high priorities cannot be scheduled (i.e., they are awaiting labor or material) a physical review of the file is made to identify one meeting Scheduling's needs--and hopefully one that is of higher priority than the rest at P&P.

The huge facility history file discussed in Chapter III is also maintained by the P&P Unit. This file contains a master record for each base facility. At Camp Pendleton these total almost 3000 physical file folders on a large revolving drum built into a wall. Each file has information on a facility including its construction date, intitial cost, major renovations, annual inspection reports and other general historical data. It also has "work accomplished" and "non-accomplished" sections. "Work accomplished" is the section which is the final resting place of all the JO's for that facility. "Non-accomplished" includes those jobs on the SRMP which require attention. This would seem the logical starting point of those work requests submitted to Scheduling from P&P. However, the file is so awkward that the P&P Supervisor actually keeps these separately filed. Emergency/Service work and trend data rarely find their way into this file and would likely be irretrievable if they did. In general, this file serves to provide a source to look up specific data concerning a unique building which has been separately singled out because of some particular need.

C. THE BMAR

The Backlog of Maintenance and Repair (BMAR) Report is prepared by the P&P Unit. As previously discussed, the BMAR is a highly visible figure before Congress. At the end of each fiscal year, the base prepares a NAVMC form 11040 (Figure D.5). This form lists all the maintenance and repair that remains a firm requirement but could not be accomplished due to a lack of resources. Essentially, this form should reflect all the unaccomplished work on the SRMP plus newly identified, low priority, work requests which P&P has accumulated through the year.

All of these projects are manually listed off the files maintained by the P&P Supervisor. For each project, information is listed describing the work, type of facility, whether it is repair or maintenance work, how often the project has been submitted and its estimated costs. These costs, when totalled, represent local BMAR. At Headquarters Marine Corps (HQMC) they are totalled for all activities to represent total Marine Corps BMAR. This figure then becomes a prime factor in subsequent budgeting efforts. It also has a large impact on what Congress subsequently designates as a maintenance floor.

On 10 October each year, the BMAR Report and the Projects Plan Report are due to HQMC. The Projects Plan report is closely tied to the BMAR. It reflects those major repair projects that are estimated to exceed local approval authority limits for funding. These are submitted to HQMC for funding consideration. The reports list all projects regardless of funding constraints. They are submitted for the current fiscal year and for the follow-on fiscal year and represent the ideal situation. The actual accomplishments that result are determined by the actual fund amounts provided to each station. These reports, together with a

HQMC evaluation on relative priorities throughout the Marine Corps, impact on how much of the maintenance floor is eventually budgeted to given stations.

Preparation of these reports is a heavily manual effort requiring a great deal of phyical record screening. Last year, (for the FY83 report process) Camp Pendleton's P&P Unit used hundreds of manhours to assemble reports reflecting a $32,000,000 BMAR. This year's report (to be reported for FY84) is currently estimated to be near $62,000,000. [Ref. 16]

The report preparation process begins in June or July. However, it is not until the closing days of September before a station actually knows what projects will be finally reported. Scheduling, contracting, final fund programming - all can impact by causing last minute changes to work actually accomplished. As a result, the last few days of September and first few of October are marked by long hours and occasional labor overtime as the projects are identified, listed and typed in proper formats. This manual effort must be accomplished in time to meet the 10 October delivery date at HQMC.

V. OTHER INFORMATION PROCESSING

Chapter III discussed only one aspect of the Facility Maintenance Department's information processing: the work request. While this accounts for a large part of the Department's workload, many other processes are occuring concurrently. These also generate information management needs and have associated fiscal impacts. Although a certain amount of overlap and interaction between Divisions must occur, these additional concerns will be presented from the view of the Division having primary cognizance.

A. OPERATIONS DIVISION

This Division is central to most of the information and fiscal requirements of the Department. The Units of the Operations Division generally initiate and terminate the processes which produce the Department's main end product: work on facilities. Much of the work of the other Divisions occurs as a direct result of what happens in Operations or in support of that effort. Therefore, Operations will be examined first.

1. Planning and Estimating

The work of the estimators has been essentially discussed in Chapter III. Their involvement with a given project does not vary too much regardless of the project's origin nor does the eventual end-product of their efforts: the Job Orders, Bills of Materials and resource estimates.

2. Contract Administration

Many Departments utilize contracts to accomplish certain kinds of recurring or long term work. The main rationale behind this effort is to reduce the strain on locally available labor hours. Also, certain work requires specialized equipment or specific, long term supervision. This lends itself toward more efficient completion by a commercial company whose business is specialized in that area. Service contracts such as lawn mowing, inspection of water backflow preventers or disposal of old POL accomplish the type of constant, recurring work which would be a strain on the Department's labor pool. Repair of a large stretch of asphalt road is often done by a company with the equipment and supervisory personnel to do the job quickly and efficiently. Also, it is often more efficient and cost-effective to perform some maintenance jobs as a large, blocked project rather than piecemeal, one building at a time. Many bases contract to paint large blocks of buildings for this reason.

Most contract administration is conducted at the Base Public Works office. They handle nearly all aspects of the large scale, technical jobs. They also provide for the administration of the smaller service contracts or routine jobs in areas of advertising and bid opening. Those contracts which impact on the traditional Facilities Maintenance Department work are increasingly controlled, after award, by the Department itself. The Contracts Branch has a staff of inspectors who inspect on-going work and approve its completion. Projects are identified for contracting after review by the Facilities Maintenance Officer. The basic criteria is whether funding is available while labor is not.

Once a job is so identified, the Operations Division must prepare detailed work descriptions and specifications. The P&P Unit's inspectors usually are involved in the estimates for cost and materials. Funding can derive from the local maintenance floor, from other base O&M,MC accounts or from HQMC. Internal maintenance floor funds are provided as for any other job. Base funds from the Comptroller usually involve negotiation and command priority decisions, especially if the funds must be reprogrammed from some other base activity. These funds are forwarded from Department's Fiscal Branch to the Public Works office where the actual contract invoices are paid.

HQMC funds are applied for if the job entails a major repair costing over $75,000 (for a major activity--$2000 for a minor activity) or if a maintenance project is of a magnitude that would strain the local budget. Most HQMC projects are administered and inspected by Public Works. The bulk of these projects come from the annual Projects Plan discussed in Chapter IV.

The Contracts Branch provides the Fiscal Branch with the preliminary work estimates for a given contract. The Fiscal Branch then forwards this fund amount to Public Works. Public Works actually ensures the contractor is paid. Meanwhile, the Contracts Branch receives copies of the amounts paid and compares these to the estimated amount as a means of controlling fund status. The Branch maintains a status board of on-going contracts as well as a series of ledgers and log books.

When a contract is completed, it is logged as being closed out. Copies of all work documents are sent to P&P. There, the data applicable to projects on the SRMP is noted. Any work involving a facility is filed in the facility history file. [Ref. 17]

3. Construction

Construction, (or "new work") projects can be viewed as separate entities. "Construction" deals exclusively with renovation or alteration of existing facilities or creation of totally new facilities. Generally, if a project results in a new entity, or a change in the configuration/use of an old entity, it is a construction project as opposed to a maintenance or repair project.

Construction involves its own set of regulations and fiscal constraints. Large construction projects of entire new facilities usually are treated as separate line items of the Military Construction Appropriation. These are closely controlled by Congress. HQMC approves and funds minor construction involving projects under $200,000 each. Those under $50,000, for major activities, or $2000, for minor activities, are controlled and funded at the activity level. These derive their funding from the maintenance floor. 6% of the local floor can be used for minor construction each year.

A minor construction project does not count against the annual EMAR. It also is not a matter of concern during the annual inspection cycles. Generally, any minor construction accomplished eats into the primary purpose of the maintenance floor which is to repair and maintain the existing plant account. As a result, construction projects are carefully controlled and approved only for projects:

> ....required to accomplish the assigned mission or changes thereto, to improve operating efficiency, and to meet national/local health, safety, environmental, natural resources and energy standards/goals.... [Ref. 18 : p. 3-4].

Usually, each base has a minor construction committee which meets and reviews local projects for consideration and approval.

Aside from the fiscal requirement to fund these projects with FCC "R" funds (vice "M" funds for maintenance and repair) the processing of minor construction projects is the same as for repair projects. The unique nature of the work does require a separate control and identification requirement as these projects are planned, processed and filed.

4. Self-Help Projects

Quoting MCO P11000.7_:

> Within the policy limitations...military personnel may maintain and repair barracks, recreational facilities, and grounds designated for their use. The term self-help is applied to such labor services as differentiated from services performed by military personnel permanently assigned or temporarily detailed to the Facilities Maintenance Department.
>
> The self-help program is limited to those types of tasks normally undertaken by a prudent homeowner using minimum craft skills and simple handtools [Ref. 7 : p.1-7].

Self-help projects are usually handled outside the mainstream of normal facilities work. While an individual self-help project may be minor in nature, it can have major affects on morale, command self-image, and general good relations between the Department and its various customer activities. It also can help reduce minor maintenance costs.

In order to preclude a random, uncontrolled quantity of self-help projects, base regulations generally forbid any such work without express approval from the Facilities Maintenance Department. This curtails the problems with poor workmanship, unauthorized or dangerous materials and occasionally whimsical projects which will simply be undone (or redone) every time a new commanding officer takes over a command.

Facilities Maintenance Departments usually establish a unique self-help desk within the Operations Division. There, one or two knowledgable individuals receive self-help requests. These personnel essentially act the roles of P&E, Scheduling, and supervision on a reduced scale. They visit the site of the proposed project and first verify that it is within the capabilities of the requesting unit. They also verify that the project is not somehow going to impact other work such as new construction projects or a specific job order already submitted for that facility. If the self-help personnel have reservations about a project or note potential problems, they report these to the Operations Officer who intercedes if necessary.

If the project is approved, the self-help personnel assist the requesting organization in preparing material estimates. The military labor used by the requestor is not charged as a project cost but an estimate may be given to the requestor to give an indication of crew size, time, etc. The labor of the Department personnel is accounted for as Department overhead. General assistance in planning and organizing the project is provided where needed.

The self-help personnel actually take care of the material ordering. They prepare the documents and deliver them to Shop Stores where they are processed as any other BOM. Because of the nature of most of these projects, Shop Stores can frequently provide the materials from inventory. The self-help personnel inventory the material upon receipt and notify the requestor. The materials are funded by the Facilities Maintenance Department as part of the maintenance floor.

As work progresses, the self-help personnel continue to provide assistance in the form of advice, guidance and quality assurance. Self-help records are kept manually with a series of log books and files. This data is rarely reflected in the facility history file. [Ref. 10]

B. MAINTENANCE AND REPAIR DIVISION

Chapter III discussed the processing of work requests within the various work centers of the M&R Division. The accounting and reporting of materials and labor were of particular interest. The Emergency/Service (E/S) Unit was mentioned in passing. This Unit is involved in a significant aspect of the Department's workload: the E/S ticket.

MCO P11000.7_ defines the Emergency and Service types of work:

> EMERGENCY WORK. Work requiring immediate action to correct or prevent loss or damage to Government property, restore disrupted essential services, or eliminate hazards to personnel or property. The work is authorized by a locally prescribed form. When emergency work is not completed within the maximum limit of 16 hours, the remainder of the work is authorized by a specific job order.
>
> SERVICE WORK. Work which is relatively minor in scope, not emergency work by nature, normally estimated to require 16 hours or less to accomplish, involves a maximum of two work centers and requires labor and material costs totalling less than $400. Service work is authorized by an emergency or service work authorization or a locally prescribed form. [Ref. 7 : p. 4-6].

The processing of an E/S ticket actually begins in the Work Reception and Control Unit of the Operations Division. Service type work is screened out during the initial work request review and forwarded directly to the M&R Division. The usual criteria for screening is based on whether the request involves less than 16 hours labor. The majority of emergency work requests are received by telephone. At some larger activities, the Emergency Work Reception Desk is manned 24 hours a day. At smaller ones, a call may be recorded by an answering device. In either case, the information concerning the work is typed onto an E/S ticket (see Figure D.6). At a large installation like Camp Pendleton, the sheer number of these tickets can be startling. Camp Pendleton processes approximatly 100,000 of these tickets

every year. Each one is manually typed on a ticket. Copies of the tickets are filed and processed as described below.

The E/S receptionist has the basic training to identify bona-fide emergencies; i.e., those things which impact on safety or property damage. These are coded on the E/S ticket as such so they are flagged for immediate attention. Copies are filed by facility as outstanding tickets. If it is a "base facility", a copy goes to the E/S Unit and is logged in. E/S tickets for "housing facilities" go to the Housing Office where they are recorded. If area work centers are used, some means is used to transport a ticket copy to the appicable work center. At some larger installations this may involve a teletype arrangement with a receiver at each work center.

The applicable work center foreman (or, if area work centers are not used, the central E/S work center foreman) receives each ticket. Throughout the day, he makes final decisions on priorities and dispatching crews. The crews usually have some kind of vehicle pre-supplied with high usage materials such as electrical fixtures, pipe parts, nails, etc. As each ticket is completed, the labor and material is recorded on it. Each day these, and the work center timecards, are delivered to the central E/S Unit office. These timecards and labor figures are then handled in the same manner as those for other shops. The one difference is that labor is all recorded against one E/S labor code rather than different ones accounting for various crafts.

The E/S log is reviewed once a day to note uncompleted tickets. An E/S ticket is supposed to be closed within five days. The E/S Unit Supervisor notes those which have exceeded this timeframe and discusses them with the applicable foreman. This hopefully precludes occaisional loss of a ticket. It also allows identification of problems which

may evolve as a result of material delivery or scope changes. Some E/S tickets may result in formal work request processing as the crew finds the problem was simply part of a larger one; i.e., further work will exceed 16 hours.

Closed-out tickets are recorded in the log book and filed by facility. A copy is sent to the area commander or Housing Office with cognizance over the facility concerned. If vandalism has been involved, this is noted for command attention.

Some facilities develop trend problems which may be symptomatic of larger problems. For example, repeated plumbing leak calls in a short period of time may indicate a need to replace the entire plumbing system in that facility. Notice of these trends is usually dependent on the various work crews or the foreman. If one of them becomes aware of such a trend, the foreman relays this information to the E/S Unit Supervisor. It eventually finds its way to the P&P Unit and an Inspector is dispatched to evaluate the problem. It may then enter the system as discussed in Chapter IV.

As indicated, "housing work" is generally divorced from other base work. It also accounts for a substantial portion of the E/S tickets. The Housing Office administers these separately although the work center foreman regards them like any other. Labor and material costs associated with any housing work are reimbursed to the Facilities Maintenance Department from the Housing Funds. Usually, Housing E/S tickets are recorded against a Standing JO while Specific JO's are processed as outlined in Chapter III. [Ref. 15], [Ref. 19]

C. UTILITIES DIVISION

This Division exists outside the general flow of maintenance and repair. Nevertheless, it has its own major involvement in the flows of information and fiscal accounting.

As a result of the energy crisis of the seventies, utility operations throughout DOD have received a great deal of attention. The need to conserve was prompted by the lower supplies of energy-producing materials together with the accompanying erosion of available O&M,MC dollars as prices fluctuate. Installation utility operations have become a high priority item for modernization and improved efficiency. Large emergency dollar amounts have been set aside and used for projects that can demonstrate energy conservation improvements. Many beneficial improvements have resulted, but high emphasis continues as utility bills and budgets grow.

The Utility Division is composed of the personnel needed to run non-automated utility plants, monitor automated plants, conduct on-site inspections of equipment and perform equipment servicing and maintenance functions. Their labor is charged to the codes for base utility operations. If their preventive maintenance efforts reveal the need for actual repairs, this work enters the system in much the same manner as a work request generated by a P&P Inspector. The repairs are then assigned to the appropriate work center of the M&R Division.

The Utility Division has a direct role in generating the billing for station-produced utilities and verifying the bills received for commercially produced utilities. Personnel within the Division read meters thereby producing usage data for the various tenant activities and the base in general. If the services consumed are produced by on-base

plants, the charges are forwarded to the Base Cost Accounting office. The users then "pay" these bills (i.e., the respective budget adjustments are made) and, in essence, reimburse the Facilities Maintenance Department's O&M,MC funds. For commercial services, the usage charged (kilowatt/hours, cubic yards of gas, etc.) is verified and the bill is certified by the Utilities Division Supervisor. It is then forwarded to Base Cost Accounting for payment. This causes a reduction in the Department's O&M,MC funds. Regardless of transaction, the Department's Fiscal Branch receives eventual notice through the PRIME system entries and by receipt of billing copies.

The problem of manual files plagues the Utility Division as it does other Divisions of the Department. Budgeting requires historical usage data; challenges by a tenant require research to answer; specific managerial queries require response. All these actions can be accommodated only through laborious manual research. During recent budget preparations at MCDEC Quantico, a half manday was expended to research electrical usage through seventeen different accounts containing four different rate schedules. Similar efforts are needed for gas and water usage. The final result is often viewed as a "best guess". [Ref. 20]

Use of this data and its associated relation to funding and fiscal procedures will be examined in the next Chapter.

D. ADMINISTRATIVE DIVISION

The Supply and Fiscal Branches of this Division have been discussed in past Chapters and will be discussed again in future ones. This Division also has an important personnel management role. It is reponsible for the personnel accounting, labor relations discussions and general maintenance of the labor resources.

The Division maintains a large collection of individual personnel files reflecting general employee information. It also has a personnel action file for each Department Work Center which records personnel actions for that center (e.g. promotions, reassignments, terminations, etc.). The Table of Organization (T/O) is also constantly under review within this Division's purview. Each person within the Department is assigned to the T/O by specific line number. Changes are constantly being made as the Department strives to maximize the effective use of the labor funds available.

The Department's maintenance floor funds contain a prescribed amount for civilian labor. Since the Facilities Maintenance Department employs the bulk of an activity's civilian force--maybe as much as two-thirds at a large installation--this fund amount can be substantial. The amount allocated for labor, together with the T/O, specifically limits the number of personnel the Department employs. This, of course, has a direct impact on the workload accomplishment. As previously discussed, if other funds are available, but labor is not, the job may be done by commercial contract. The Administrative Division, through its maintenance of personnel levels and manipulation of the T/O, strives to ensure maximum efficiency is attained from available labor funds. The Fiscal Branch works closely with the personnel clerks to account for labor fund expenditures.

Labor relations and Equal Employment Opportunity programs are a steady, but minor workload. These are handled on a case-by-case basis. [Ref. 21]

VI. THE PRIME SYSTEM AND OTHER FISCAL PROCESSING

It is apparant, from the discussion is Chapters III, IV and V, that fiscal requirements are a common thread running through all aspects of the Facilities Maintenance Department's conduct of operations. This Chapter will tie some of these threads together at their focal point: the Fiscal Branch. While this is actually a part of the Administrative Division, this Branch's efforts are significant enough to necessitate specific study in a separate chapter. In order to understand some of the framework behind the Fiscal Branch activities, it is first necessary to have a basic understanding of the PRIME system. Fiscal requirements are an outgrowth of many fiduciary and DOD dictated regulations. PRIME is the currently existant automated system supporting these requirements and is therefore of particular interest in this study.

A. THE PRIME ACCOUNTING SYSTEM

By the late 1960's, the Secretary of Defense (SECDEF) had noticed problems occuring because of the multitude of disjointed resource management systems then existing throughout DOD. There was no single DOD system to tie these together into a unified DOD effort. As a result, the Resource Management System (RMS) was instituted. PRIME (an acronym for Priority Management Efforts) was the subsystem created in response to changes needed in programming, budgeting and accounting systems. Its purpose was to provide a system "...for the management of inventory and capital acquisitions, and to develop a top management reporting system...." [Ref. 22 : p. 8] In this endeavor, SECDEF wanted a system to meet two goals:

-Assure that financial reports and cost data provided adequate support for the planning-programming-budgeting system.

-See that the Agency's managers are given the basic tools they need--responsibility centered, cost-based operating budgets and financial reports--for setting and achieving maximum cost reduction goals [Ref. 22 : p. 5].

The PRIME system developed and installed in the Marine Corps is representative of the 1960's era batch-oriented computer technology. A central computer site receives data entered from remote sites, stores it, and then batch processes the data to generate reports and updates. Reports are in the form of hardcopy printouts distributed to the various base activities. These reports--in varying formats tailored to the needs of the varying users--reflect the official accounting status for the user based on the update of the last processing cycle.

Since inception, PRIME has undergone the usual sequence of enhancements and revisions inherent to a long standing computer system. However, as it exists today, it is still reflective of the 1960's environment. Unfortunatly, the intervening 20-plus years have seen a huge growth in reporting requirements, a substantial increase in dollar amounts and increasing pressure on local FA's to tightly manage their funds. The inevitable result is that PRIME is reaching the end of its ability to support the requirements of a 1980's fiscal manager. Recognizing this fact, the Marine Corps is now well along in its development of the SABRS system discussed if Appendix A.

PRIME developers put a great deal of effort into addressing the needs of the FA. Yet PRIME is essentially an accountant's system. PRIME update cycles are run on a schedule established by the Cost Accounting Department. Input to the system is contingent on local Cost Accounting procedures. Output, including the resulting reports needed

by the FA's, is contingent on this update cycle. The timeliness of the reports today is frequently non-supportive of the FA's needs for current information. The old formats are also an increasing source of discontent among FA's [Ref. 5]. Whether these are shortcomings in the system itself, or in the way it has come to be used, is a matter of contention. Further discussion of these perceived shortcomings will be presented in Chapter VIII.

PRIME accounting and reporting revolves around the JON. As previously noted, material and labor costs find their way into the PRIME system from their various sources throughout the base. The computer assures that these are expensed to the correct JON. It also uses the same data to update general ledgers and summaries of the various accounts. It is thus possible to generate reports reflecting individual JO status as well as summary account status. This type of data identification actually works quite well. The new SABRS system retains essentially the same procedures revolving around JON identification. This effort is the reason for assigning all the accounting codes at the Fiscal Branch when a JO is initiated.

The PRIME system generates a periodic MJON report as previously discussed. This report is produced based on local time schedules as determined by Base Cost Accounting. The MJON reflects the official balances and charges to valid JON's within the current fiscal year. The MJON File maintained by the PRIME system is a basic key to the remainder of the system. Its purpose is to:

1. Provide a file of all valid, active and inactive job order records.

2. Provide a record of all charges against each job order record for hours, cost and work unit data where applicable.

3. Provide all source data for the preparation of local management reports and reports to higher authority.... [Ref. 23 : p. 4-85]

The PRIME system also generates other reports such as the Reimbursable Orders Report, Fund Administrators Management Report and Unfilled Orders Status Report. These reports allow the FA to examine fund information from various viewpoints: individual JCN totals, budget versus actual expense, unfilled orders which have obligations against them, etc.

B. ACCOUNTING FOR FUNDS

The Fiscal Branch maintains a series of desktop ledgers, each reflecting the various fund accounts the Department must administer. These ledgers deal with funds for utility payments, job orders (standing and specific), reimbursables, contracts, etc. Each year, after the budget cycle (discussed later) a "maintenance floor" dollar amount is provided out of O&M,MC funds. Certain other funds may also be provided for such things as reimbursables: for example, work done by Camp Pendleton for the Base Hospital is funded from the Navy medical community and work done to support the local air facility is funded by MCAS El Toro which has cognizance over the facility.

The ledgers are manual, desktop records showing funds allocated to the Department, funds used, the JON which used them and the running balance. This data is also retained in the mechanized PRIME system. The ledgers are kept constantly up to date as each transaction passes through the Fiscal Branch.

The official PRIME reports are continuously reconciled against the manual ledgers to correct discrepancies. It should be noted that the ledgers serve as the Facilities Maintenance Officer's daily source of fund status and other information. They are current as of the last manual transaction recorded by the Fiscal Branch. The PRIME reports are current as of the last update cycle run by the computer

center and do not reflect any transactions occuring between update and report delivery. This timelag may be a matter of days or weeks depending on the report and the installation. Nevertheless, the ledgers represent unofficial status while the PRIME system reports official balances as of the moment of update.

When approved for Scheduling, JO's enter the PRIME system as discussed in Chapter III. They are also entered into the manual ledgers. As labor is expended on a JO, the applicable ledgers are updated. Material requisitions come through the Fiscal Branch with cost estimates. These are used to commit (reserve) funds. Actual material costs are entered by the Base Supply Department and rarely reflect the estimates used. A typical sequence would be: 1) An estimated amount (off the BOM) is entered in a ledger for outstanding reservations; 2) When the material is ordered, the amounts obligated are entered into the unfilled order ledger and the outstanding reservation ledger is reduced accordingly; 3) When the invoices for the material are paid, the amounts are reflected in an expense ledger and the unfilled orders ledger is reduced.

The MJON, and other reports, are used to gather actual costs in conjunction with a constant string of telephoned discussion between Base Supply and the Fiscal Branch. In this manner, the Fiscal Branch tries to keep its books current. As the fiscal year draws to a close, the unfilled orders and other sources of pending expense become a critical factor in assuring sufficient funds are available to close out the year--and to assure over-obligation does not occur. If, for some reason, material is ordered and no reservations are recorded by the Fiscal Branch--for instance, due to an internal distribution problem or a Supply Department error--the sudden impact of unplanned expenses can have a very unsettling affect on fiscal status.

Reimbursables require the same careful control to ensure actual funds used match the amounts provided from the reimbursing activity. As funds run low, that activity must be notified. It can then decide whether to provide additional funding or face loss of services. Fiscal year-end balancing must be timely enough to avoid placing the reimbursing activity in financial trouble.

Utility bills are paid as billed by the commercial vendor or reimbursed as notified by Base Accounting. Fiscal Branch receives energy consumption reports from the Utilities Division. The totals reflected have been compared to the total usage for which the utility company--or on-base plant--is charging. The constantly fluctuating energy prices must be closely monitored and compared to available funding quantities. Timeliness of the PRIME system reporting becomes a genuine concern in keeping up with utility expenditures.

Throughout this cycle of constant monitoring and reconciliation, sudden special requirements must be accommodated. For example, the storm damage of the 1982/1983 winter storms at Camp Pendleton prompted crucial decisions on fund reprogramming. Certain planned activities had to be cancelled or deferred in order to fund the necessary cleanup and repair and still allow funding of projects already initiated.

This kind of constant decision making and re-evaluation is not unique to Facilities Maintenance. It, of course, pervades managerial action throughout DOD and private industry. The intent of this study is to point out the intense reliance on manual processing. While the mechanized system may be doing well in accounting for Marine Corps costs, the output is not providing its intended support to the low level managers--at least not as the system is presently being operated. They are often faced with necessary decisions which must be made on the basis of unofficial balances, intuition and some guesswork on the projected variances they can expect.

C. BUDGETING

The FA is the lowest reporting point for the annual budget cycle. The raw, specific data entered at this level eventually becomes the basis for the budget evolving at the DOD level. Early each calendar year field budget guidance is received by the Base Comptroller. This prompts a budget call to the various FA's. Guidance is issued, meetings are held and the FA's begin to assemble their budget requests. The budget cycle, and its associated requirements are not unique to the Facilities Maintenance Department. The general processes and specific requirements are an established matter of annual procedure. This study does not intend to cover these details. Rather, this study will examine how the data is gathered by the Fiscal Branch and what separate entities make up the Facilities Maintenance Department's budget request.

The Scheduler's Short Range Maintenance Plan (SRMP) and Long Range Maintenance Plan (LRMP) are of particular interest as the Department attempts to forecast its needs. These provide the bulk of the known maintenance and repair requirements. As discussed in Chapter IV, these requirements feed the annual BMAR figure reported to HQMC. This is therefore a justification for a specific level of resource requests. At the HQMC level, this requirement is reflected in the Marine Corps inputs to the Planning, Programming and Budgeting cycle (PPBS). It is thus a consideration in the formation of the President's annual budget.

Added to these planned projects are occasional unique items which become known through various channels--for instance, the requirement to install 250 SABRS terminals throughout the base became a concern during the latest budget cycle at Camp Pendleton's Facilities Maintenance Department. The total fund requirements for the workload

identified is an outgrowth if the estimates generated by the P&E and P&P Units.

Other historical data on general operations is used to forecast requirements for items such as administrative supplies, PCL, labor overhead, etc. Historical data also helps in forecasting utility usage. As discussed in the preceeding chapter, this data is difficult to attain and its accuracy may be less than optimal. Even accurate historical data is of little help in forecasting utility prices because of the rapid changes in rate structure. The utility budget has been a very time consuming, much-discussed and heavily belabored process. [Ref. 12]

In general, the budget evolves as a result of manual preparation, personal experience, Department-wide discussion and physical file search. Much of it is tied to how well the P&E and P&P estimators have been able to arrive at their estimates.

VII. IMPACT OF REQUIREMENTS TO STUDY CONTRACTING OF COMMERCIAL SERVICES

In 1967, The Office of Management and Budget (OMB) published OMB Circular A-76 titled "Policies for Acquiring Commercial or Industrial Products and Services for Government Use". Supplemental guidance to this policy was issued in 1976 and 1977. In 1979, an entire revision and update was promulgated [Ref. 24]. This latest issue prompted renewed attention in the area of contracting for government services. It required all Federal agencies to study their respective functions, conduct a cost analysis on those functions and then submit them to the public sector for competitive bid. The intent was to identify the Government tasks which could be performed in a more cost-effective manner by commercial sources. This action would make Government operations more economical while providing increased employment for the public sector. The only functions to be excluded from this process were those clearly defined as unique to Governmental control--functions that embraced:

> ....the activities that should always be performed by Government personnel because they involve exercising governmental authority, controlling monetary transactions and entitlements, and maintaining needed core capabilities.... [Ref. 24 : p. 20556].

The impact of the revised Circular A-76 has been far reaching. All Federal agencies have conducted extensive studies of all current and future functions to identify those applicable to contracting with a commercial source. One of the largest functions so defined has been the maintenance of facilities. This function is, after all, not unique

to the Government. It is conducted, in some form, by virtually every private business and many public companies exist which contract their services for these tasks.

In 1981, HQMC issued guidance identifying functions which must be reviewed for Circular A-76 consideration [Ref. 25]. It directed that certain functions be reviewed each year over a five year period. The schedule was such that every function would then be reviewed again at five year intervals. Activities were to conduct a full analysis of these functions, determine their cost of operations and submit them for competitive bid.

The impact has been an intensive examination within the Facilities Maintenance Departments. Study groups have been formed, records researched and documents prepared -- an effort that has involved months of work throughout Fiscal Years 1982 and 1983. At Camp Pendleton, the study group is composed of the M&R Division Head, five Shop foremen, two Unit supervisors, a staff of secretarial personnel and a contracts/procurement expert. They have been tasked to work full time on the project and their normal billets have been filled by someone else in the Department. By the time they are done, they will have invested a full calendar year in preparing the documentation required. [Ref. 26] Other bases have similar groups working in a locally prescribed manner to address the problem.

The study group must painstakingly analyze every task performed within the Department. They must prepare explicit performance-of-work statements which define all aspects of that task. They must research past files and identify how often a task is to be done, how much it costs, manpower involved, expertise level--virtually everything that relates to that task. In order to accomplish this analysis, they have had to work through files of past years' work orders, job orders, E/S tickets, fiscal reports and history files.

As already noted in previous chapters, these are manual files and require a great deal of physical effort to research.

The final product of this effort is to be a set of documents with work descriptions and specifications in enough detail to permit solicitation for contract bids. At the same time, an analysis of how much it costs the Government to perform these tasks under the current system (i.e. with Facilities Maintenance Departments) is to be prepared and submitted. This estimate will become the Government's "bid" on the contract. After all documentation has been reviewed and a contract solicitation has been prepared commercial businesses will have the opportunity to submit their bids. If they can perform the functions at less cost, they will receive a contract to do so.

There have evolved two fundamental approaches to the study. Some bases, like MCAGTC 29 Palms, are examining various functions of facilities maintenance independently. They are attempting to divide the overall maintenance effort into specific, identifiable tasks. Each is then analyzed and prepared for consideration as a separate contract. Other bases, like MCB Camp Pendleton, are viewing facilities maintenance as one all-encompassing function. They are preparing to submit this entire function as one single contract. The approach used has been left to the discretion of the local activity.

After this initial effort has been completed, continuing study requirements will exist. If a private vendor wins the contract for these services, it will be a one-year contract with a three-year renewable option clause. This means, at the end of each year, the government could elect not to renew. As a result, the bid process would start again.

If a contractor fails to win the initial bid--or if the Government later resumes the services--the Government will perform these functions under its current organization for five years. At the end of that time, the whole analysis and resubmission for bids would be conducted again.

The intent of this study is not to examine the massive impacts of Circular A-76. Rather, it is to identify another labor intensive problem associated with information processing and fiscal impacts. The current manual systems make the needed detailed analysis a laborious, painstaking process. Approximately 10 manyears will be invested at Camp Pendleton in simply identifying, and quantifying, tasks. This requirement will occur repeatedly in the outyears.

The fiscal impacts have yet to be clarified. An obvious one is the amount of labor and associated wages that is being drained from the O&M,MC maintenance floor in the conduct of these studies. Aside from that factor, eventual award to a contractor may make processing of fiscal data easier to accomplish. The labor and material costs currently in the budget would simply become a source of funds used to pay a contractor. As a result, much of the current requirements to identify labor and material against JON's may be removed. However, the problems of cost over-runs and change orders could place additional burdens on station budgeting. The requirement for precise historical fiscal data to feed the recurring review processes can be filled from the current PRIME system reports. The requirement for current fiscal data to manage the contracts should place less of a burden on the existing systems because the funds are being dealt with as summary amounts in a payment schedule.

VIII. CURRENT AND FUTURE SYSTEM SUPPORT

The preceeding Chapters have discussed the myriad of internal tasks conducted by Facilities Maintenance Departments. The intent has been to provide an analytical basis for examining alternative methods of performing these tasks. This Chapter will discuss some of the current and future systems support available to assist the Facilities Maintenance Officer in performing managerial functions.

A. FACILITIES MAINTENANCE MANAGEMENT REPORTING (FMMR) SYSTEM

The FMMR system (discussed in Appendix E) is currently the subject of a great deal of controversy among Marine Corps Facilities Maintenance Officers and HQMC. Over the years, many Facilities Maintenance Departments have used the system less and less. Complaints with timeliness were matched with normal managerial desires to see data in differing formats.

The timeliness issue is one that has been raised repeatedly during both formal and informal discussions while this study was conducted. It was a consistent complaint in response to questionnaires sent to all ground stations [Ref. 5]. Timeliness problems may be tied directly to the batch-processing orientation of the PRIME system. It may also be due to a failure on the part of the facilities maintenance establishment to properly work with the accounting establishment and ensure that their ADP needs were always addressed. An example of the communication breakdown between the two communities can be seen in a study of the report generation schedule: MCO P7300.1B [Ref. 23]

requires FMMR report preparation by the 13th of each month; MCO P11000.7_ [Ref. 7] requires it five days after completion of a Job Order or by the 5th of each month. The actual schedule varies greatly from station to station depending on the perceived requirements of the Base Accounting structure and on how influential the Facilities Maintenance Department has been in securing ADP support.

The timeliness problem has a direct influence on fiscal management. Frequently the Fiscal Branch's manual ledgers show a job completed but PRIME records it as such several days or weeks later when all the bills have been liquidated. As a result, information which could prompt corrective action is reflected for a job that, to the Department, was long closed. The opportunity for timely action has passed.

The particular fiscal problems with year-end closeouts also plague the FMMR reports. The system is designed to assign new JON's to uncompleted jobs at the end of the fiscal year. Users are supposed to provide special year-end input to pick up the old JON data with a new JON. It is rarely done, frequently because users do not seem to be aware of the capability. At some stations, even when aware, it is not working properly, anyway.

The format change desires mentioned above are simply not feasible for PRIME to address. In a batch system, formats cannot be recreated with every new Facilties Maintenance Officer. Some local systems have been devised to address these problems and most interface with local PRIME systems. Even these are difficult to change and tend to report information in the format of their designer. Many other Departments accumulate the data they desire manually [Ref. 5].

The nature of the data in the FMMR reports is only occasionally an aspect of complaint. The ratio of material to labor costs used on Reports No. 1 and 4 is of dubious value

since both factors are extremely variant depending on the nature of each job. This ratio may have value for long-term trend evaluation but its short-term evaluation use is vague. The need to identify and correct problems in EPS use, program control and general cost overruns is recognized and has direct fiscal impact. Most managers, when they use the reports at all, tend to pick select items from each of them. Reports No. 5 and 6 have been frequently ignored over the years [Ref. 27].

1. Report No. 1

As noted in previous chapters, the EPS estimates have a large impact on subsequent fiscal acccunting. Therefore, a method of comparing EPS estimates to actual labor used is a good way of evaluating their credibility. The non-EPS labor estimates and the material estimates, when compared to actual amounts, provide good methods of monitoring the performance of the estimators. Since estimates have such a major impact on initial fund commitments and budgeting processes, it is desirable to identify problems for prompt correction. However, the timeliness issues already mentioned make prompt correction difficult: the problems identified may be too old to have an affect on events already in motion. Trend problems can be spotted and corrected to preclude future recurrence but not in time to affect jobs already completed. Specific problems for a given job will not be noticed until the job has been liquidated. Frequently this happens several weeks after the job has been closed by the Department.

2. Report No.2

This report can serve two purposes. It can show where the bulk of the productive work and overhead work is applied. For example, in figure E.2 the bulk of productive

labor has been for service tickets. The report also allows managerial focus on problems when overhead labor accounts for a disproportionate level of total labor. This may prompt corrective actions. It also impacts on budget forecasts for total labor required. These tend to be longterm managerial decisions. The timeliness problem may have less of an impact on the value of this report's data.

3. Report No.3

The manhour and labor cost estimates are derived from the EPS. This report provides a different view of these than Report No. 1 since it sums them by JO rather than Work Center. This report should identify variances in labor and material estimating efforts. Hopefully, because of the JO breakdown, trend problems could be identified in estimating certains types of jobs--although that data may be obscure to the evaluator because those jobs are not listed together. A variance report grouping JO's by variance amounts, and then grouping them again by Work Center, may make it easier to spot job types with estimation trend problems.

4. Report No. 4

Since many Standing JO's exist to serve reimbursable services, the summary cost data on this report can have significant fiscal interest. The nature of standing JO's fequently precludes use of EPS estimation methods for labor. Material estimates are also difficult because of the unknown frequency of actual work performance. This report provides an indication of how well planners and estimators can predict these costs. The accuracy of these predictions can have an impact on budget request and reimbursement planning for the Facilties Maintenance Department and the serviced organization.

Evaluation of standing JO's is not as dependent on closeout data except for those that terminate at the end of a fiscal year. Rather, accumulated data is more important as this may impact on a reimbursing activity's fund actions. This report would seem to lend itself to frequent generation as data is entered against the JO. Unfortunatly, this may not be possible since FMMR reports are dependent on PRIME cycle updates. A frequent update for the express purpose of generating one or two reports is expensive and not very practical (a problem which pertains to the FMMR system in general as well as Report No. 4 in particular).

5. Reports No. 5 and 6

These manually prepared reports are particularly unpopular. Since the data they reflect is often out of date anyway, many activities resent the manual effort required to prepare them. Stations are frequently far ahead of the FMMR in jobs completed and started. Hence, they feel Report No. 5 does not correctly reflect the true status of their efforts. Report No. 6 has effectiveness ratings weighted to reward compliance with the "Primary Maintenance Policy" of generating most work off the SRMP and LRMP. Since this does not reflect the "real world" work schedule of the typical Department, the facility managers feel it provides an inaccurate measure of their real maintenance efforts. They also complain of a lack of HQMC feedback on the report. Hence, they have no idea how they compare or what is the HQMC evaluation of their efforts.

These problems have recently received high level attention. Field Supply and Maintenance Analysis Office Iwo Report No. 22036 recommended that HQMC correct the deficiencies in the reports or eliminate the requirement for their submission [Ref. 28]. A student at Wright-Patterson Industrial College is currently studying the FMMR as a

thesis topic for Master's research [Ref. 27]. He is examining the effectiveness evaluation measurements inherent to the system. The requirement to submit Report No. 6 has once again received HQMC emphasis after being long ignored [Ref. 29]. The activities have been polled by HQMC to provide their input on why Report No. 6 is not optimum. Plans are currently being worked out to conduct a FMMR test cycle at MCDEC Quantico late in FY83 to examine the system, discover its value and impact on current-day operations and identify problem areas needing correction.

In summary, in its current implementation, the FMMR system is of uncertain value to the Facilities Maintenance Departments. Some activities use it and prepare reports knowing the data is out of date or inaccurate; some use select items they find useful; some ignore it altogether. Whether this is due to a poor system, or a good one which has aged too far, or a lack of education for the users is, essentially, a moot point. Regardless of reason, the system does not, at this time, completely serve the user and is thus having only a minor impact on efficient management of funds and resources.

B. PRIME ENHANCEMENT

As the name implies, PRIME Enhancement is a system modification of the PRIME system. It is scheduled to be active July 1983 [Ref. 30]. This change provides some of the SABRS benefits as an interim measure while full SABRS implementation is pending. When PRIME Enhancement is in place, the PRIME input previously discussed will still be held for batch processing. However, after the PRIME update cycle is run, select files will go to update a data base accessed by a data base management system (DBMS) called ADABAS. The same data will enter the system from the same sources, but

the Scandata input devices will be complemented with IBM CRT terminals.

The PRIME system reports from this change will be the same. The major improvement will be an on-line "inquiry" capability to access the files loaded into the data base. Under the current PRIME system, reports are generated as hardcopy printouts only. The enhancement permits the user to access select JON's or other files to gain specific information. As already discussed, the resulting information may be days or weeks old depending on the time of the last update cycle. The enhancement provides the potential for more timely information after an update and easier response to select inquiries.

Any problems with standard report content and the utility of that report (as perceived by a given user) will not be corrected. Also, the generation of the reports will still be as dictated by the accounting community. If that schedule is not satisfactory to facilities managers, they must still intercede on their own behalf to garner increased support from the system. The enhancement does give them the potential for more timely access to the information the PRIME system has. PRIME Enhancement is viewed as a temporary system designed to address some needs until the SABRS system is implemented. It is not intended to operate more than one year.

C. THE SABRS SYSTEM

The SABRS system (discussed in Appendix A) is currently scheduled to commence operation in October 1984. It appears this system will rectify the problems of timely, accurate information on fiscal status. When fully operational, the Fiscal Branch should be able to eliminate its dependence on the manual ledgers. The SABRS system will provide the same

information within sixteen seconds through the IBM CRT terminal being installed for PRIME Enhancement. This information, which is unofficial fiscal status, will be current as of the last transaction entered. The "official" status will be updated every 24 hours. The system will employ the same DBMS--i.e. ADABAS--which will be initiated for PRIME Enhancement.

The problems with report formats should be resolved with the "ad hoc" report potential of the system. FA's can request to view data from many perspectives. As noted in Appendix A, SABRS will not help the FA to gather the data for input to the system. The procedures and processing discussed in Chapters III, IV, V and VII will be essentially unaffected.

The relationship between SABRS and the FMMR system remains uncertain. The SABRS development team has received very scanty information from the facilities maintenance community concerning what standard reports are needed [Ref. 31]. Undoubtedly, some of the problem is due to the current controversy over the FMMR that exists within that community itself. The SABRS data dictionary (Appendix A, Table II), as it currently exists seems to reflect the necessary data for the facilities manager to use in measuring performance (note the elements on Table II with the double asterick--**--which has been inserted by the author). With the potential for ad hoc report generation, the continued need for stylized Reports No. 1 through 4 may by superfluous. If liaison can be established early, it is quite possible Report No. 6, if it is needed at HQMC, can be automatically generated. Regardless, the laborious manual processing internal to the Facilities Maintenance Department will be unaffected. If an internal system is established for these Departments, there may be no need for mangerial reports (e.g. variance checks, EPS usage data, etc.) to be

generated from SABRS. However, a requirement will always exist for official fiscal status reflecting current JON information and budgeting data. The internally generated information must marry with that produced externally in order to give the manager a complete picture.

D. THE BEST SYSTEM

The Navy's BEST System (discussed in Appendix F) is representative of facilities management systems currently under development in the Federal sector. Another example is one developed by the Air Force called BEAM (Base Engineer Automated Management system). These systems address many of the manual processing and report problems discussed in this study. Besides streamlining the internal operations, they provide for tighter managerial control, more precise fiscal accounting and concise, well-formatted reporting.

Similarities in operations, plus the inter-agency relationships between the Navy and the Marine Corps, make the BEST system particularly attractive for Marine Corps implementation. The Navy is developing BEST with funding from the Productivity Enhancement Capital Investment (PECI) program of the Office of the Secretary of Defense. The system will be Navy-wide on standard equipment with software maintenance and technical phase-in support from NAVFACENGCOM. One of the system modules, FEJE, is being developed for DOD-wide use.

Some BEST system components seem to have particular value to Marine Corps facilities maintenance. The FEJE system vastly improves and streamlines much of the P&P and P&E Units' efforts in estimation and scheduling. The Work Input Control (WIC) system provides the control and reporting which is the underlying rationale for the FMMR system--plus much more. The Emergency/Service (E/S) system permits more efficient control of the thousands of annual

E/S tickets generated. When completed, the Shore Facilities Inspection (SFI) system appears to address the scheduling of inspections from the SRMP and helps balance the in-house workload with contracted supplemental service. The Utilities system may be of benefit. Some of its intended use could probably be addressed by simple modifications to these base utility monitoring systems currently in use.

The information from these systems will have the advantage of local, real-time access to an internal data base. Fiscal information for budgeting and for fund obligation estimates would be timely and accurate. Managerial control of estimating procedures, productivity-to-overhead labor ratios and material accounting would be enhanced.

The software for the BEST system is available through the Navy by exercising normal inter-service channels. Unless the Marine Corps can somehow attach itself to the PECI funding process, the hardware would have to be funded from Marine Corps sources.

Throughout the course of this study, the BEST system has repeatedly entered formal and informal discussions. Its concepts are almost universally well received and many Marine Facilities Maintenance Department personnel at all levels have expressed an interest in such a system.

E. CURRENT FACILITIES MAINTENANCE DEPARTMENT AUTOMATION EFFORTS

The pressures to manage their workload and achieve maximum results for their funds has caused many Facilities Maintenance Officers to look for better methods to accomplish these tasks. Nearly all the respondents to the station questionnaires indicated an interest in some sort of automation. Some have actively pursued this effort, some are in the planning stages and some are considering it.

Pursuit of full internal ADP support has been a discouraging process for most who have engaged in it. The tremendous bureaucratic requirements connected with such support has dampened the enthusiasm of many such investigations in their preliminary stages. However, the necessity to automate is still prevalent. The inevitable result has been an active endeavor to achieve as much support as possible within their own means. Local activities are exploring the possibility of using their own funds to purchase file management systems with word processing and report generation capabilities. This, at least, assists in control of jobs and retrieval of information. The reports are in formats preferred and, because it is internal to the Department, formats can be changed as needed. The Fiscal Branch has access to data when it is entered rather than after it is routed to them. The budgetary historical data is easier to recall and less susceptible to error.

Two stations, MCDEC Quantico and MCB Camp Pendleton, are emplacing locally purchased IBM 5520's with remote terminals. These do not have computational capabilities but are filling some of the other managerial information needs. Their early success with the portions of the system that are now in place has resulted in great enthusiasm on their part. Other stations are examining this system or similar ones and are actively seeking fund sources. MCB Camp Lejeune has conducted a detailed study of the data processing it needs and is now exploring hardware requirements. MCB Camp Pendleton is also well along in plans to place the entire facilities history file on microfiche--a step already taken at MCDEC Quantico. This may not help solve problems with putting information into the file but they believe it will help retrieve and store that data.

Autcmated support for utilities is also available and in place at some staticns. These allow one operator in the Facilities Maintenance Department to monitor energy consumption throughout the base, adjust temperatures in at least the most significant areas (e.g., a block of barracks), monitor key steamline points for trouble signs and automatically ccntrcl various automated (i.e. unmanned) utility plants at remote sites. That same operator can provide precise data concerning how much electricity or water has been used for any given time period and how much was provided from off-base commercial sources. All this infcrmation is available at a complex of terminals and controls within a small office in the Utilites Division.

Collectively, as a group, facilities personnel are not receptive tc the idea of depending on external ADP support from large systems. They have particular requirements, usually unique to their workload, as do most FA's. The requirement to depend on a RASC for the ADP support they can easily have internal to their Departments--support which other RASC users have no particular interest in--is not one they can easily accept [Ref. 5].

HQMC agencies are currently studying these internal ADP support needs. Unfortunately, they are not gathering much informaticn from the local users which such systems will support.

IX. PROBLEMS AND RECOMMENDATIONS

The previous chapters have related the various aspects and tasks of facilities maintenance management. This Chapter will review the previous ones to identify the specific problems which evolve out of that examination. The problems identified will be presented in a "problem-discussion-recommendation" format. The "discussion" portion will usually be a brief synopsis of previous discussion appearing earlier in this study. The chapter and page numbers in parenthesis in each "discussion" block refer to the more comprehensive examination contained elsewhere in the study.

A. OPERATIONAL SUPPORT PROBLEMS

1. PROBLEM: Internal work processing is dependent on manual input and routing.

DISCUSSION: Table I in Chapter III reflects a period of 25 1/2 days spent in routing and processing one work request (Ch. III, p. 39). Of that time, 10 1/2 days were dedicated to the preparation and internal routing of various papers. Paper input from the various customers is necessary to gain entry to the Facilities Maintenance Department. The work requests and inspection reports serve to initiate processing and to provide an historical hardcopy file. However, once received, these could be easily keyed on a terminal into a data base or file management system. Once there, the data is subject to prompt recall throughout the Department using other terminals. Proper input fields for each type of work entered would make retrieval at the various Departments easy. They could then identify the various JO's and E/S tickets applicable to them, could act on their respective

requirements and record those actions as they occur. This would result in a continual update for work status thereby eliminating the manual pending file and its constant manipulation (Ch. III, p. 25). The overall result would be quicker processing, easy recall of work status and better managerial feedback (Ch. III and V).

RECOMMENDATION: Enter the information upon receipt into an automated record system so it can be recalled at any location in the Department.

2. PROBLEM: Forms and reports are manually prepared.

DISCUSSION: The various Divisions require paper output for some aspects of each job. P&E personnel need a work request copy to carry for their on-site inspections (Ch. III, p. 27), E/S personnel need a copy of the E/S ticket for reference (Ch. V, p. 53), BOM's must be forwarded from the Supply Branch to the Base Supply (Ch. III, p. 31), BMAR reports must be sent to HQMC (Ch. IV, p. 44). Forms and reports are a fact of life and cannot be realistically replaced in their entirety by a terminal display. However, automation can reduce the time physically spent in their preparation and thus cut more time off that 10 1/2 days discussed in Problem #1 above. Since the information must be recorded anyway--either manually or on a terminal--it is a simple matter to have a printer produce standard forms as output. The resulting information will tend to be more accurate, easily reproduced and consistent across the various Divisions if it is drawn from a central source.

RECOMMENDATION: Provide a hardcopy printing capability for reporting and form preparation.

3. PROBLEM: Manual files are awkward and cluttered.

DISCUSSION: Besides ease of routing and form preparation, an automated file system as discussed above lends itself to easier information retrieval to support historical enquiry.

The current manual files are extremely awkward to deal with. Information needed is difficult to retrieve and may be scattered across more than one source. Updating information may enter one file but not another. The facility history file (Ch. IV, p. 43) is an example of one that should lend itself to a wealth of information on any given facility or facility type. However, some information may not be finding its way to that file and, if it does, is difficult to retrieve. Utility usage (Ch. V, p. 56) is hard to retrieve; trend information and redundancy checks (Ch. IV, p. 42) are hard to pursue.

The historical data resident in these files is a necessary aspect of managerial problem identification. It is also crucial in budget formulation (Ch. VI, p. 64). In its current status, such endeavors are difficult and time-consuming. The final results are always in danger of being less than all-inclusive as it is easy to miss some information while researching the diverse files.

The BEST system (Appendix F) is an example of a technique which centralizes the files for all the work in a Department. It uses a central data base. Such a data base could store all the facility history files, especially if some sort of secondary storage is established for archival information (e.g. disk packs). All work processed could then automatically update this data base for easy, accurate and comprehensive retrieval. Such a data base could also exist for personnel records (Ch. V, p. 57) and utilities usage (Ch. V, p. 56). Appropriate interfacing would permit information retrieval from varying viewpoints to accommodate varying needs.

RECOMMENDATION: Create a data base composed of diverse facility information such as is employed by the BEST system. This should be interfaced with data bases for personnel and utilities.

4. PROBLEM: Estimation of labor and material is difficult and time consuming.

DISCUSSION: The importance of these estimates is discussed throughout this study. They form the basis for the budget requests submitted on projected workloads (Ch. VI, p. 64); they are inherent to the BMAR formulation (Ch. IV, p. 44) which eventually finds its way to Congress; they are included in the A-76 functional cost estimates (Ch. VII, p. 67); they are the costs entered as commitments by the Fiscal Branch (Ch. VI, p. 62). The need for accurate estimates is obvious.

Various automated systems exist to address this need. The FEJE module of the Navy's BEST system (Appendix F, p. 133) is a particularly good one. Any system which would assist the P&E personnel in their laborious search through EPS books (Ch. III, p. 27) would be of benefit.

RECOMMENDATION: Automate the P&E procedures in a manner similar to the BEST system's FEJE module.

5. PROBLEM: Materials status by job is reliant on diverse information over long periods of time.

DISCUSSION: The Supply Branch has a constant manual tracking problem as it strives to keep current with material status (Ch. III, p. 32). Material usually arrives one piece at a time and must be recorded against the proper job. The status of ordered material must be kept current so Scheduling can be notified about problems. Excess material must be returned or, if retained, kept with inventory controls (Ch. III, p. 37). The result of this effort is constant file manipulation and frequent phone calls.

The M3S system's data base organization should help expedite some of the information flow between the Supply Branch and the Base Supply system. If the Supply Branch's terminal for M3S can be interfaced with an internal system

of information storage, much of the data common to one can be matched to the other automatically. As M3S provides notice of material status, the requisite job information in the Department's files can be updated and would then be readily accessable to the Scheduler. As credits are issued for excess returns, the job cost records could be automatically adjusted (Ch. III, p. 38).

RECOMMENDATION: Interface Department supply records with Base Supply records in a SABRS/M3S environment.

6. PROBLEM: It is difficult to keep track of approved but unscheduled projects.

DISCUSSION: At any given time the Scheduler has a backlog of approved projects which are in various stages of processing. They are unscheduled, usually while awaiting material or labor availability. These are currently accounted for with manual files and a large status board. As the status changes, they require continual updating (Ch. III, pp. 30 & 32).

If all data pertaining to projects is in an automated system as previously discussed, a system such as the WIC module of the Navy's BEST system would accomplish this update action. The resulting information would always be current and easily retrieved in whatever sequence desired.

RECOMMENDATION: Provide a job control schedule interfacing capability like the BEST system's WIC mocule.

7. PROBLEM: Scheduling of work requires constant manual adjustments and coordination.

DISCUSSION: Actual scheduling of work for the various work centers currently requires a two week process (Ch. III, p. 33). After all the negotiations and assignments are made, the addition of the inevitable "sudden priority" causes constant turmoil. Adjustments must be made, "filler" jobs of lower priority must be inserted, uncompleted work must be accounted for in future scheduling actions.

Proper scheduling results in the highest priority work receiving the primary labor effort. In other words, it promotes effective labor utilization. As discussed in Chapter V (p. 57), the labor funds constitute a healthy percentage of available O&M,MC funds. Optimally, the Facilities Maintenance Officer would prefer to expend these resources on the highest priorities first.

An automated system such as the BEST system's WIC module would greatly facilitate the effort to match resources with requirements. It would also help alleviate the time consuming, and often frantic, efforts to make last minute adjustments for sudden work inputs. The weekly scheduling meeting (Ch. III, p. 33) should probably still be held. This provides an excellent interfacing environment, ensures unresolved issues are addressed and provides a unity of effort for all concerned. An automated scheduling system would cut the required leadtimes for such a meeting, provide quicker answers to questions and allow better identification of adjustment impacts.

RECOMMENDATION: Provide a Decision Support System (DSS) like the BEST system's WIC module to help generate work schedules.

8. PROBLEM: SRMP and LRMP planning is static and hard to interface with current facility histories.

DISCUSSION: These plans (Ch. IV, p. 41) are manually prepared once a year. Because of their size and content, it is not practical to update them as as work is accomplished except to note those projects completed. Each year a new plan must be created reflecting the uncompleted work of the old plan and the newly identified work.

The inspection schedules evolving from these plans (Ch. IV, p. 40) are difficult to prioritize. The plans should also assist in identifying potential contract work: i.e.

planned work for which labor resources will probably not be available. A method to identify and evaluate these needs in an up-to-date changing environment is needed. The SFI module of the BEST system is an example of such a system. Regardless of the system employed, it should have access to the facility history file. This would result in easier identification of completed, uncompleted and projected workloads by individual facility and facility type.

RECOMMENDATION: Load the plans with access to a facilities data base and generate plans using a BEST system SFI type of program.

9. PROBLEM: Annual BMAR identification is difficult, time constrained and potentially inaccurate.

DISCUSSION: The annual preparation of the BMAR report (Ch. V, p. 44) could easily be accomplished as an end product of the systems discussed in the above Problems. Since data on the facility history, work completed, work planned and work scheduled is all accessable, the required data for BMAR identification could simply be isolated and retrieved. The result would be a more accurate BMAR figure reflecting a truer picture of resource requirements.

As installations become better in their inspection scheduling and backlog identification, the BMAR has shown a tendency to grow. Congress has often been told that a BMAR growth for a given year is due to refining identification techniques. This was one of the explanations given for MCB Camp Pendleton's large increase in 1983. The implication is that an even larger BMAR exists but has not been wholly defined. Until it is, Congressional allocation can not address the entire problem. In the meantime, testimony that certain fund levels are needed to overcome the BMAR is often followed by a generous provision of those funds by Congress (Ch. I, p. 11) only to be in turn followed by another growth

in the BMAR. The inevitable result is a potential for erosion of Marine Corps credibility before Congress.

RECOMMENDATION: Provide automatic BMAR generation as a natural result of automatic SRMP and LRMP procedures.

10. PROBLEM: Trend information on specific facilities is hard to identify.

DISCUSSION: The difficulty in dealing with the diverse manual files prevents identification of trend problems. When certain kinds of work are repeated more than standards warrant, this should prompt exploration of the cause. This would assist in discovering faulty work--in-house or contracted--as well as assist in addressing large problems as a whole rather than piecemeal. Currently, personal memory and worker reliability is the key to identifying such trends (Ch. V, p. 54).

If E/S work and inspection results can feed a central data base of facilities, retrieval of trend information by individual facility or facility type would be relatively easy. This would enhance planning and fund utilitzation.

RECOMMENDATION: Provide an anlysis of Facility numbers by WCC using the file system discussed in Problem #3 above.

B. FISCAL SUPPORT PROBLEMS

1. PROBLEM: Fiscal data maintained within the Department is not reflective of official accounting system data.

DISCUSSION: The timeliness of fiscal data feedback has been discussed throughout this study, especially in Chapter VI. Efficient utilization of funds necessitates prompt, accurate information on fund status. The current shortcomings in this area should be resolved when the SABRS system is operable. The necessity to maintain the current manual ledgers could then be eliminated (Ch. VI, p. 61).

RECOMMENDATION: Provide a SABRS type feedback and eliminate the manual ledgers.

2. PROBLEM: Labor and material estimate inaccuracies cause fiscal adjustment problems.

DISCUSSION: The discussion of Problem No. 4 in the "Operations Support Problems" section above applies here. Besides the impacts on budgeting and BMAR calculations, erroneous estimates create a great deal of problems in fiscal adjustments. When obligated funds are insufficient to meet actual expenses, the FA may be faced with the legal problems of over-obligating O&M,MC funds. When committed (reserved) funds are excessive, these funds are unnecessarily tied up and unavailable for use until late in the fiscal year--or not at all if the fiscal year ends. Another consideration is the 6% of M-1 (maintenance) funds which can be used for R-1 (construction) work (Ch. V, p. 49). This percentage is carefully controlled. Erroneous estimates could cause it to be violated.

RECOMMENDATION: Use a FEJE type system to enhance accuracy as described in Problem #4 above.

3. PROBLEM: Adjustments to Fiscal status enter into the accounting system from sources outside the Fiscal Branch.

DISCUSSION: The Fiscal Branch must deal with information which originates at several locations within the Facilities Maintenance Department and throughout the base. If the information is untimely or inaccurate, the Fiscal Branch must track down discrepancies through correspondence and phone calls (Ch. VI, p. 62).

On-line interface with the Supply system--both internal and external--would help resolve problems in material cost information. It would also help recapture excess credits. On-line interface with the Comptroller and Accounting Departments would assist in the capture and adjustment of

utility costs (Ch. V, p. 56), reimbursables (Ch. VI, p. 63) and official fund status. On-line monitoring of labor input would help correct errors and record timely information.

RECOMMENDATION: Provide a SABRS type feedback with on-line interface to the accounting/supply data base.

4. PROBLEM: Budgeting historical data is dependent on personal recall and laborious manual file search.

DISCUSSION: The recall of accurate historical data directly impacts on the decisions and justifications which feed the budget request each year (Ch. VI, p. 65). The current systems for retrieving this data are dependent on personal recall and potentially error-prone file searches. The diversity of these files has already been discussed. If they were automated as outlined in Problem #3 of the "Operations Support Problems" section above, the gathering of historical data would be quicker and more accurate. By providing the Fiscal Branch with on-line access to these files, current fiscal data and adjustments can be easily entered and later retrieved.

RECOMMENDATION: Provide on-line access to the automated information system discussed in Problem #1 and #3 of the Operational Support section above.

C. MANAGERIAL SUPPORT PROBLEMS

1. PROBLEM: The current reporting systems (especially FMMR) do not provide needed managerial information support.

DISCUSSION: The problems with untimely information were discussed in Chapter VIII, (p. 70). That problem can easily be solved with an on-line terminal capability providing access to a frequently updated data base. SABRS already addresses the fiscal side of information needs. An internal system to produce the operational side--the variances,

progress reports, usage data, etc.--would provide the manager with the quick response needed for prompt corrective actions. Such a system would need to report long-term trend information as well as current job information. This long-term picture allows the managerial adjustments to organization and procedures that would preclude the short term problems. It should also have an "ad hoc" information retrieval capability so information can be examined from differing viewpoints.

The Facilities Maintenance Officer is under pressure to achieve maximum utilization of available funds. The ultimate goal is to reduce the BMAR and effectively maintain facilities so the BMAR does not rise again. A practical management reporting system provides the needed tools to achieve that goal.

RECOMMENDATION: Provide an on-line access to a data base containing information using a system such as the BEST system's WIC module in conjunction with the SABRS-type fiscal reporting.

2. PROBLEM: "Special" projects require special information retrieval.

DISCUSSION: Certain high priority, command interest projects are a fact of life (Ch. III, p. 28). Command prerogative will always be excerised as various commanders place emphasis in differing areas. Certain types of jobs, such as specific E/S work on a particular building, receive prominance at high levels in the command structure. The personal attention paid to these jobs is directed to the Facilities Maintenance Officer. That person needs on-line, accurate access to job information on a case-by-case basis in order to answer specific queries.

RECOMMENDATION: Provide managerial access to the files data base discussed in Problem #3 of the Operational Support section.

3. PROBLEM: A-76 requirements have created unique information gathering and retrieval problems.

DISCUSSION: The "Commercial Activities" program of OMB Circular A-76 has placed a severe managerial strain on the systems for information gathering (Ch. VII). Most of the historical and trend data discussed in preceeding problem statements is applicable to the management of this program. Initiation of an internal, automated source of information will curtail the bulk of the work spent researching and compiling data.

If commercial contracts are let for the conduct of facilities maintenance, the need for an information system will not expire. The information is still needed for subsequent reviews; the command structure which hires the contractor still requires information to monitor progress and effectiveness; the fiscal system still needs budget and cost information. An internal system could easily be employed by a commercial contractor for the same purposes as the Government counterpart with the same impacts on efficiency and effective fund utilization.

RECOMMENDATION: Initiate the file data base system in Problem #3 of the Operational Support section.

4. PROBLEM: Personnel management requires manual adjustments of T/C line numbers, personnel files and labor usage data.

DISCUSSION: An automated source of personnel information has the same potential managerial benefits as the automated facilities data. In fact, effective management of personnel has a direct relation to the final accomplishment of maintenance work (Ch. V, p. 57). Fiscal management, operational progress management and personnel management tie together in an inseparable triangle with one supporting the other two. Effective assignment of local labor talent assists in the effective accomplishment of work and the effective use of the substantial labor funds.

Certain aspects of personnel management are, by their nature, intensely manual processes requiring personal managerial involvement. Obviously, such things as counseling, labor negotiations, greivance reviews and Equal Employment Opportunity complaints cannot be automated. However, quick recall of the personnel files and related statistics can be of immense help in dealing with these tasks.

RECOMMENDATION: Create a T/O and personnel data base to allow efficient adjustments and reporting. Interface this with the Fiscal Branch.

5. PROBLEM: Labor reporting is done by various sources on diverse forms.

DISCUSSION: Currently, all labor-hours and wage information is accumulated from forms prepared by the work crew foreman. This level is the appropriate starting point for this data and the need for a some kind of on-site entry system can not be changed. However, once the timecards are turned in they are transcribed several times onto Work Center timesheets and Job Order records (Ch. III, p. 35). This creates a potential for incompatible entries between the recording channels. Such inaccuracies often appear later in the accounting system when labor hours used do not match labor hours paid. There are methods, such OCR-scannable forms, which could make the collection of labor hours more efficient and less susceptible to error.

An additional problem is that all the timekeepers must physically relocate to one location, with all their timesheets, and enter labor data on the Department's one input terminal (Ch. III, p. 36). This ties up personnel and the terminal until all data has been entered.

RECOMMENDATION: Reporting locations should be equipped with their own on-line terminal with all reported data feeding the previously described central system. The use of

a form with a potential for more direct input (e.g., OCR scannable) should also be explored.

D. MARINE CORPS-WIDE CONCERNS

1. PROBLEM: The facilities maintenance community is not working with the accounting and ADP communities to enhance ADP support.

DISCUSSION: During the course of this study, it has become apparent that the facilities maintenance community has not done a very good job of making its needs known. Large portions of that community have been discouraged by the bureaucracy involved in ADP matters. Many have encountered a lack of understanding of their actual problems. Some may be independent and colloquial enough to desire to solve their own problems. A good many are simply frustrated (Ch. VIII, p. 80). The fact apparent is, since the initiation of the FMMR system, few subsequent HQMC initiatives have been directed toward addressing their needs. Some of the problem has been the local ignorance on how to voice the needs, some has been lack of HQMC appreciation for the severity of the needs. Recently, this trend has begun to reverse. However, with a potentially powerful management air such as SABRS close to implementation, the facilities maintenance community still has provided scant input on its needs from that system (Ch. VIII, p. 77). They could again find themselves accepting what the accounting community has decided to provide simply because the accounting community knows they need <u>something</u> but the facilities community has not told them exactly <u>what</u>.

RECOMMENDATION: That dialogue be opened at HQMC Department levels, needs and guidelines be established, and appropriate, synchronized guidance be issued down respective command channels.

2. PROBLEM: Stations are automating in a random, uncoordinated manner.

DISCUSSION: While they are not working well with some of the outside agencies which could help them, local Facilities Maintenance Departments continue to try and automate. The sheer complexity of their work and the pressures to produce push any prudent manager to reach for any tool available, including ADP support (Ch. VIII, p. 79). It would seem obvious that this inevitable result should occur after a unified, well-planned implementation effort. Instead the facilities maintenance activities are automating piecemeal within the restrictions of regulations and funding constraints (Ch. VIII, p. 80). The resulting systems are in danger of being a patchwork of tools addressed to specific urgent needs rather than smooth, all-encompassing systems meeting all the user needs. Such "patchwork" systems are susceptible to increased maintenance problems and often fail to realize the full potential of ADP support.

HQMC is beginning to study the needs of the local activities. The BEST system is under serious review. Methods for general ADP support are being examined. Unfortunatly, very little input from the activities themselves has been requested. Such an approach carries the danger of system implementation which does not address local needs. The paradox is that the local activities are automating toward a future with diverse, non-standard, incompatible systems intensly oriented toward local needs. HQMC is tending toward a rigidly standard system addressing needs as percieved at the HQMC level and possibly not as responsive to unique local requirements. The optimum for future ADP support lies somewhere in the middle.

If a standard system is established for implementation, the phase-in procedures, local maintenance and training support, and general trouble shooting structures must be established by HQMC as part of a central effort.

RECOMMENDATION: Provide Headquarters Marine Corps-level guidance and assistance with an open exchange of evaluation and discussion up and down the chains of command.

3. PROBLEM: Large scale systems do not provide optimum support to unique internal FA needs.

DISCUSSION: If FA-unique information in placed on a large central system, the FA's are required to compete with large numbers of users for computer time. The big mainframe centers lend themselves toward efficient processing of large requirements and general support computations. To require such a system to maintain and process data which is of specific interest to only one user, does not seem to be an economic use of such expensive resources. The frequent result is that the unique one-user requirements take a lower priority than the general interest "big picture" information needs.

Information unique to the FA--for instance, EPS labor statistics--should be located on the FA's own internal system (Ch. VIII, p. 81). At many installations this may mean a mini-computer located in the Facilities Maintenance Department. Some small activities may get by with a micro-computer. Maintenance and support of these assets can be accomplished through Department budgeted maintenance contracts or under the auspices of RASC maintenance efforts. Control over the operation and use of such an internal system should be vested in the Facilities Maintenance Officer.

RECOMMENDATION: The systems discussed in this Chapter should be implemented on local, internal mini- or micro-computer systems.

4. PROBLEM: SABRS and M3S require specific data input in order to provide useful output.

DISCUSSICN: The large, Marine Corps-wide systems such as SABRS provide excellent information to high levels of command. They also provide good feedback dcwn to the FA. However, they do not assist the FA in the internal processes needed tc gather the information to feed these systems (Ch. I, p.11 and Appendix A, p. 105).

An internal system as previously discussed will help gather data accurately and efficiently. Since much of it is precisely the same information needed by SABRS/M3S, it seems logical to provide an interface between the internal and external systems. The large system can then process this data for system-wide use. Such an interface should reside in the Fiscal and Supply Branches or be an inherent part cf an internal mini-computer. It is not inconceivable to have such a mini-computer act as a "front-end" for the loading cf the larger system, as many commercially available machines are capable cf doing.

RECOMMENDATON: Ensure that local systems can interface with SABRS/M3S.

5. PROBLEM: Stations are diverse in size and organizaticn.

DISCUSSION: The diversity in size and mission dces not preclude a standard ADP system for facilities maintenance efforts. The processes and requirements change little from activity to activity regardless of size and mission. However, some flexibility is required to allow adjustment of the physical system to accommodate different plants. Unique local requirements--air vs. ground, supply base vs. training command--require some differing applications. The systems discussed thus far should be easily adaptable withcut majcr impact cn design.

RECCMMENDATION: System support configuration should be flexible sc it can be adopted to local requirements.

X. CONCLUSION

It appears to be only a matter of time before local FA's automate their efforts. Such an endeavor is inevitable as needs grow and users become smarter on what is possible. The concern is that this effort will be uncoordinated or forced into a less than optimal centralized support system. What seems to be happening is a classical "end user rebellion" as described by James Martin and many other noted authors. The centralized management of computer resources was initiated when computers equated to large scale funding and a high degree of expertise exercised by few people. End users have since been increasingly exposed to computer potentials and are smarter in employing them. As their demands for enhanced service have flooded in, the central structure has been increasingly unable to keep pace. The impact of Federal regulations has added to the end user perception of non-support for his/her needs. Meanwhile, prices of mini- and micro-computers have dropped while providing excellent computational power. Consequently, users are finding ways to satisfy their needs without going to the central sources. [Ref. 32] As Cash, McFarlan and McKenney state:

> Legitimate demand for information services support by users continues to vastly exceed available supply. Supplies of cost-justified applications waiting to be implemented and exceeding available staff resources by three or more years tend to be the norm rather than the exception. This has created widespread user frustration. Further, perceived unsatisfactory support and unhappy interpersonal contacts with the central information services organization continue to persist. This has increased users' natural desire to gain control over this aspect of their work. The new technologies increasingly permit users to gain this control. In addition, users' confidence in their ability to run a computer ... is not only growing but is likely to continue to grow.... [Ref. 33 : p. 72].

This "classic rebellion" brings with it a classic danger: if fifteen different stations find fifteen different ways to automate their functions, standardization and integration potential will be lost. It is not inconceivable that, at a future date, an integrated system of Facilities Maintenance Departments who can "talk" to each other--and to HQMC--will be desirable and feasible. The myriad of systems will make this very difficult.

Providing internal, FA-unique support is easily accomplished using currently available hardware. Software is also largely available. The minor aspects of software support not available are well within the current technological capability for development. Some, such as the BEST system's SFI module, are even now being devised. Following are two sample systems which could easily be implemented. The intent is not to provide a definitive system for implementation. Rather, these system examples are meant to demonstrate the technical feasibility of implementing a system such as discussed in this study.

A. SYSTEM NUMBER 1

This system (Figure 10.1) is based on a mini-computer acting as a front-end processor for a data base. The data base contains facility files, work information and personnel data. The mini-computer accesses this data base with a DBMS. It updates the data and retrieves it in necessary formats. Archival data and overflow storage is maintained on a standard commercial disk pack.

Also residing on the mini-computer is the BEST system. This provides the DSS capability to support managerial requirements as well as the computational resources for statistical analysis and estimation work.

The various operational entities have terminals. They feed all data to the mini-computer as it is generated and retrieve the packages and information unique to their use. The M&R Division's terminal provides remote output tc E/S work centers. A printing capability is provided convienient to thcse users who need hardcopy formats.

The Fiscal and Supply terminals are drawing necessary data frcm the mini-ccmputer. They are feeding the SABRS/M3S data into that system. They are also drawing current data from SABRS/M3S and using it to update the internal data base. This interfacing capability probably represents the most difficult aspect of the system example, but is well within the capability of current technology to resolve.

B. SYSTEM NUMBER 2

This system (Figure 10.2) is oriented around an office automation capability. The internal file manager draws on facility and personnel data stored in secondary disk packs. It formats this data into necessary reports reflecting needed informatiCn. P&E and Scheduling have miro-computers acting as "smart terminals". In this system the computational scftware to assist in estimations and scheduling is available cn "flcppy disks". After their work is done, the terminal off-loads the results to update the data in the central storage.

Supply and Fiscal terminals have the same role as in System # 1: they draw central data, use it to update SABRS/M3S data, and feed current information back the other way. Utilities has a terminal essentially tied into a separate base monitoring system. It provides up-to-date utility data to the central storage.

The other terminals are used to access the central data, study and edit it as necessary, and return information/revisions back. The M&R Division terminal still remotes to the E/S work centers and a printing capability is still needed.

C. SUMMARY

Again, these are not meant to be definitive systems. This study has endeavored to identify a need and to explore the nature of that need. The feasibility of solution to address that need has been shown. Detailed study with a goal of final design is the next logical step.

Streamlined procedures and enhanced managerial control will result in effective productivity and efficient utilization of funds. Automation in the form of ADP support appears to address genuine needs among Marine Corps Fund Administrators.

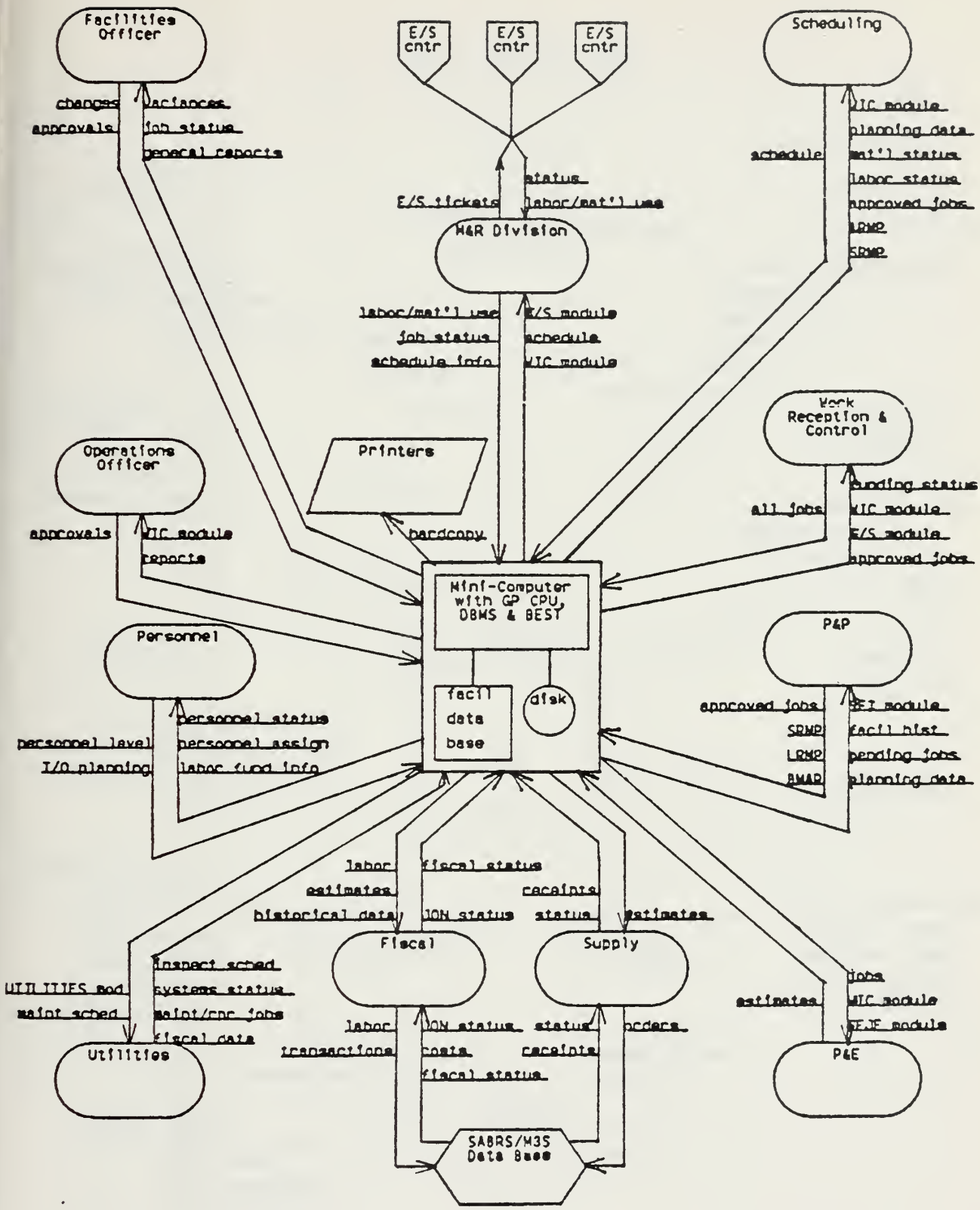

Figure 10.1 Example System #1.

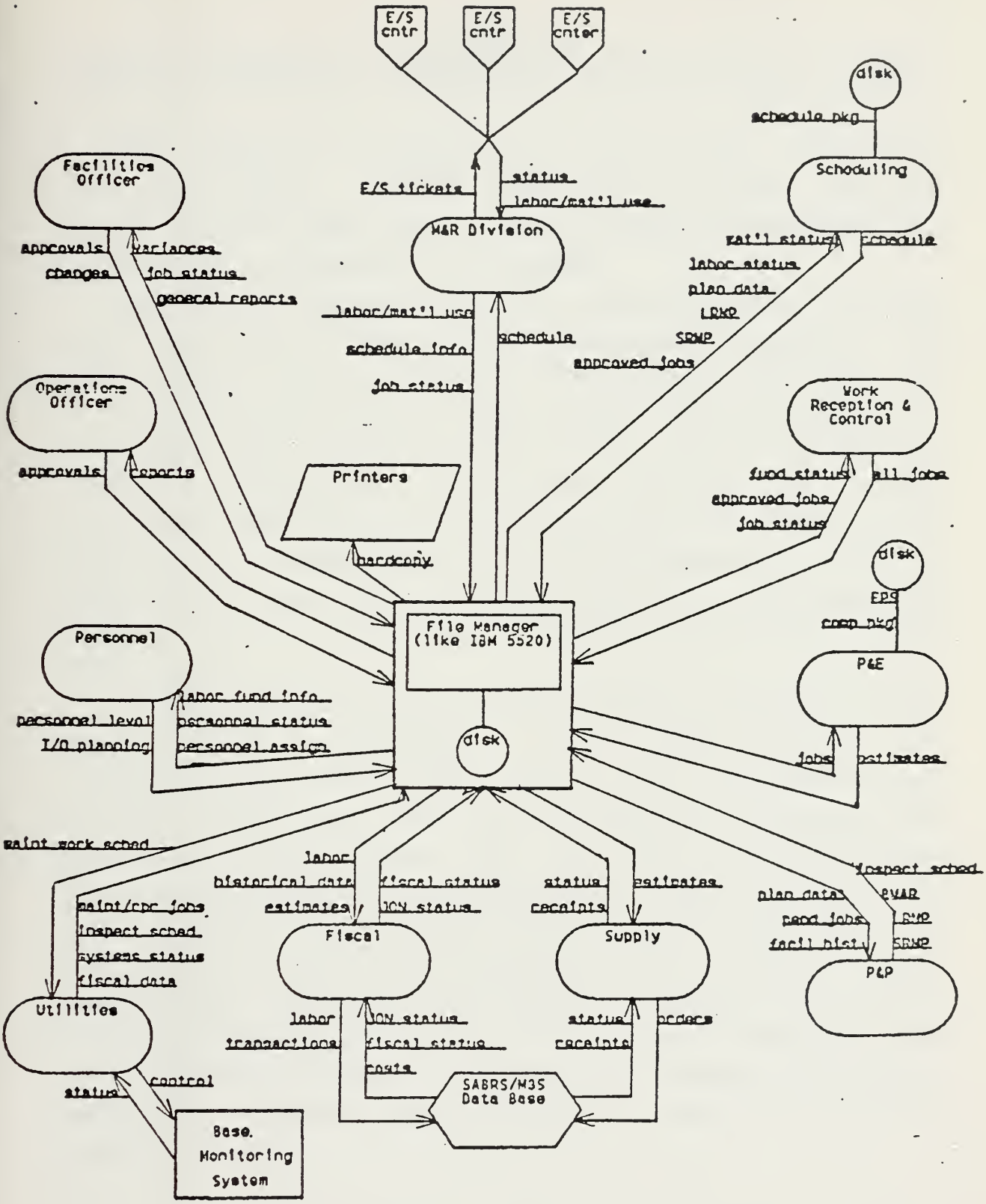

Figure 10.2 Example System #2.

APPENDIX A

STANDARD ACCOUNTING, BUDGETING AND REPORTING SYSTEM (SABRS)

This appendix is provided as a very basic overview of the SABRS system. It is drawn from the SABRS Detailed Design document [Ref. 34]. A more in-depth description can be attained by studying that document.

SABRS is a Marine Corps-wide system designed to integrate acccunting, budgeting and financial management. Its scope ranges from the individual Fund Administrator (FA) up to the Headquarters Marine Corps level. When implemented it will be a far-reaching system which provides managerial financial information at all levels. It will also collect the budget and accounting information from all levels, assimilate it into needed reports, provide managerial and fiduciary control and feed necessary information for budgeting and accounting at the Plans, Programs and Budget System (PPBS) level.

SABRS will replace many of the current automated systems such as PRIME and MAGFARS. It will interface with most internal Marine Corps systems such as M3S and JUMPS as well as many external ones such as the Integrated Disbursing and Accounting (IDA) system and the Navy Register/System Centralized Expenditure Reimbursement System (CERPS). It will, in fact, share a data base with M3S so material transactions will automatically generate their required fiscal transactions. The system will employ the computer support at the large Regional Automated Service Centers (RASC's). These will do the processing. Data will be transmitted horizontally and vertically using the Marine Corps Data Network (MCDN).

SABRS aims to reduce manual memorandum records. It will provide the FA with an on-line unofficial balance of funds that is maintained current with the most recent transactions. This data will be provided through 16-second response via a cathode ray tube (CRT) terminal. A batch update once every 24 hours will post the official fund balance and generate system-wide updates to the data base.

SABRS will generate reports including fund status, trial balance, cost information and labor distribution. It will also provide a capability for "ad hoc" reports through the CRT. Its purview includes virtually every aspect of fiscal requirements: command and legal responsibility; all cost accounting; audit trails; asset accounting; budgeting; funds management; etc.

The FA will provide the basic level of input through a CRT located with the FA's fiscal branch. Managerial information to that level can be retrieved in many standard formats as well as through "ad hoc" inquiry. At each level of fiscal accountability above the FA, similar capabilities exist. As the hierarchy narrows, lower level data is accumulated and summarized into the form needed. The basic structure is shown in Figure A.1.

It should be noted that SABRS input begins at the FA level and managerial information can be retrieved to that level. SABRS will provide the FA manager with much of his aggregate fiscal data. SABRS does not assist the FA in gathering the data from the work center level which must be inputted to the system. It also does not provide an FA with the internal managerial control and evaluation needed to manage these Work Centers.

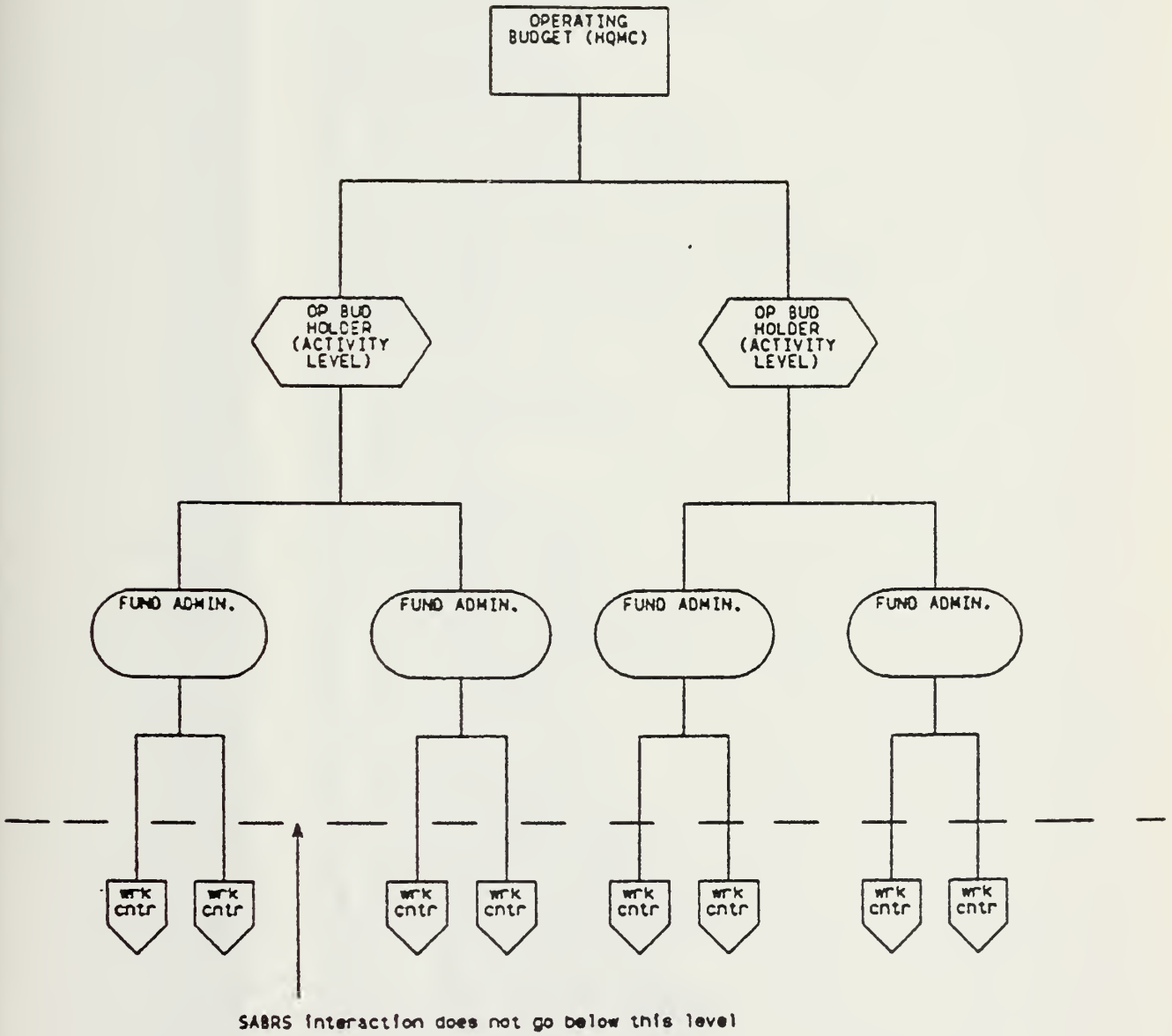

Figure A.1 SABRS Hierarchy

TABLE II

SABRS Facilities Maintenance Data Elements

```
            PRINT CF MASTER_FACILTIES
   00100    FILE ADABAS,
   00200    CONTAINS,
   00300    DID-TIME-GROUP
   00400    STANDARD-DATA
   00500    FACIL-REC
   00600    DESCRIPTORS
   00700    DID,ACTY-DATE,TIME-STAMP,
   00800    JON,APPN,OPBUD-NO,
   00900    ACTION-CODE,
**01000     WORK-CTR-CODE,
**01100     WORK-GENRTE-CODE
   01200    SUB-DESCRIPTORS
   01300    SA IS JON BYTES 1 TO 5,
   01400    SB IS JCN BYTES 6 TO 6,
   01500    SC IS JCN BYTES 7 TO 8,
   01600    SD IS JCN BYTES 12 TO 13
   01700    SUPER-DESCRIPTORS
   01800    TA IS APPN BYTES 1 TO 6 WITH
   01900    SUB-HD BYTES 1 TO 4,
   02000    TA IS OPBUD-NO BYTES 1 TO 6 WITH
   02100    OPBUD-SUFF BYTES 1 TO 1
   02200    FIELD-NAMES
   02300    AA IS DID-TIME-GROUP,
   02400    AB IS DID,
   02500    AC IS ACTY-DATE,
   02600    AD IS TIME-STAMP,
   02700    BA IS STANDARD-DATA,
   02800    BB IS JCN,
   02900    BC IS APPN,
   03000    BD IS SUB-HD,
   03100    BE IS OPBUD-NO,
   03200    BF IS OPBUD-SUFF,
**03300     CA IS FACIL-REC,
   03400    CB IS ACTION-CODE,
   03500    CC IS FISCAL-YEAR,
   03550    DJ IS MONTH-END,
**03600     CD IS WORK-CTR-CODE,
**03700     CE IS WORK-GENRTE-CODE,
**03710     DK IS EXP-ELEM,
**03720     DL IS CAT-CODE,
**03730     DM IS CAT-OF-WORK,
**03800     CF IS EST-CODE,
   03900    CG IS EDIT-CODE,
**04000     CH IS PREV-YR-JON,
**04100     CI IS EST-MANHRS,
**04200     CJ IS EST-LABOR-COST,
**04300     CK IS EST-MATL-COST,
**04400     CL IS ACTUAL-MANHRS,
**04500     CM IS ACTUAL-LABOR-COST,
**04600     CN IS ACTUAL-MATL-COST,
**04700     CO IS PROJ-MANHRS,
**04800     CP IS PROJ-LABOR-COST,
**04900     CQ IS PROJ-MATL-COST,
**05000     CR IS PREV-MONTH-MANHRS,
**05100     CS IS PREV-MONTH-LABOR,
**05200     CT IS PREV-MONTH-MATL,
**05300     CU IS CIV-HRS,
**05400     CV IS CIV-LABOR,
   05450    DN IS MIL-COMP-CODE,
```

TABLE II (continued)

```
**05500     CW IS MIL-HRS,
**05600     CX IS AMT-BILLED,
**05800     CZ IS EPS,
  05900     DB IS QTR-ID,
  06000     DC IS QTR-NO,
  06100     DD IS RATE-ACTY,
**06200     DE IS UNIT-UTIL,
**06300     DF IS UTIL-CODE,
**06400     DG IS INDUST-PLANT-EQUIP,
  06500     DH IS CAPTL-RECOV-FACTOR,
**06600     DI IS FISC-YEAR-MANHRS
```

APPENDIX B

"GENERIC" FACILITIES MAINTENANCE ORGANIZATION

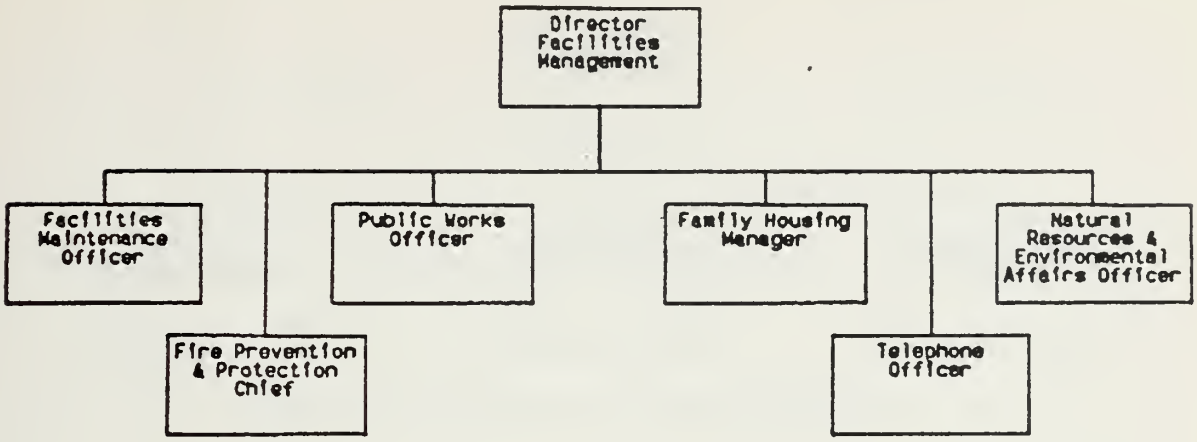

Figure B.1 Typical Facilities Management Organization.

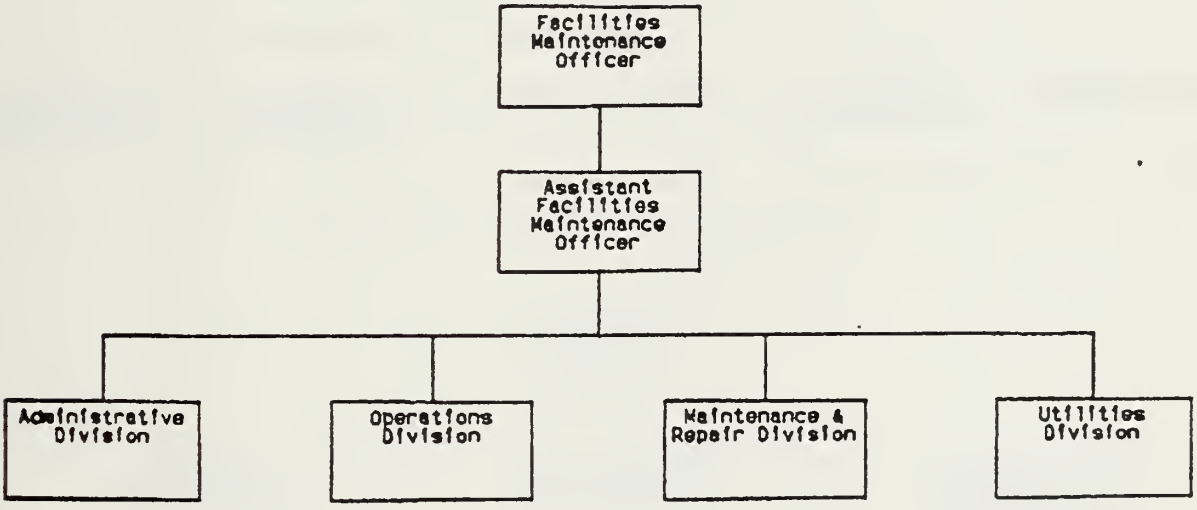

Figure B.2 Facilities Maintenance Department.

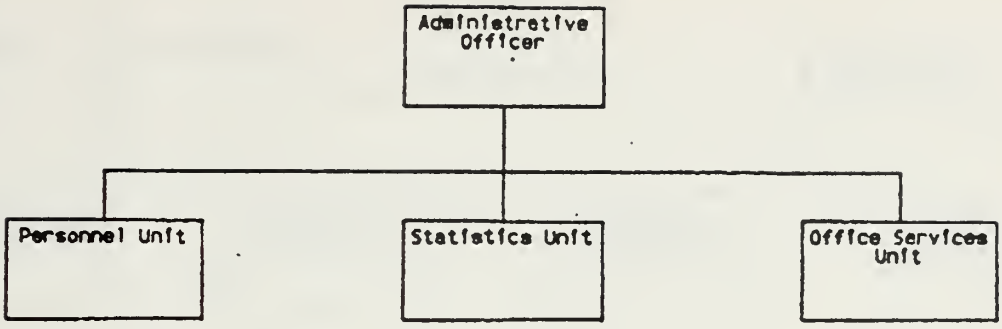

Figure B.3 Administrative Division.

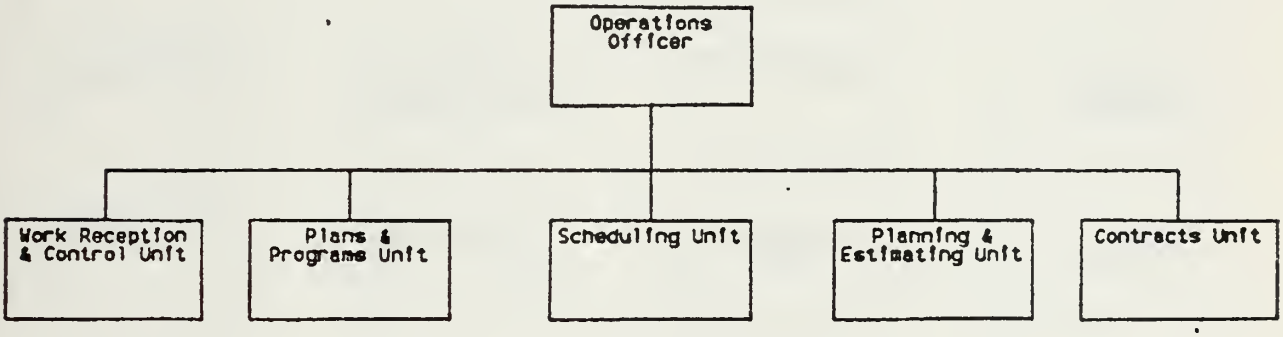

Figure B.4 Operations Division.

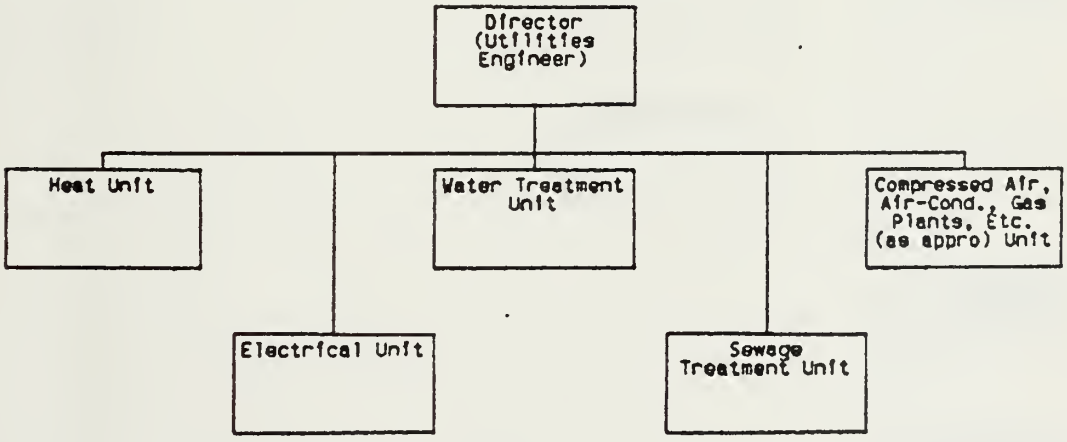

Figure B.5 Utilities Division.

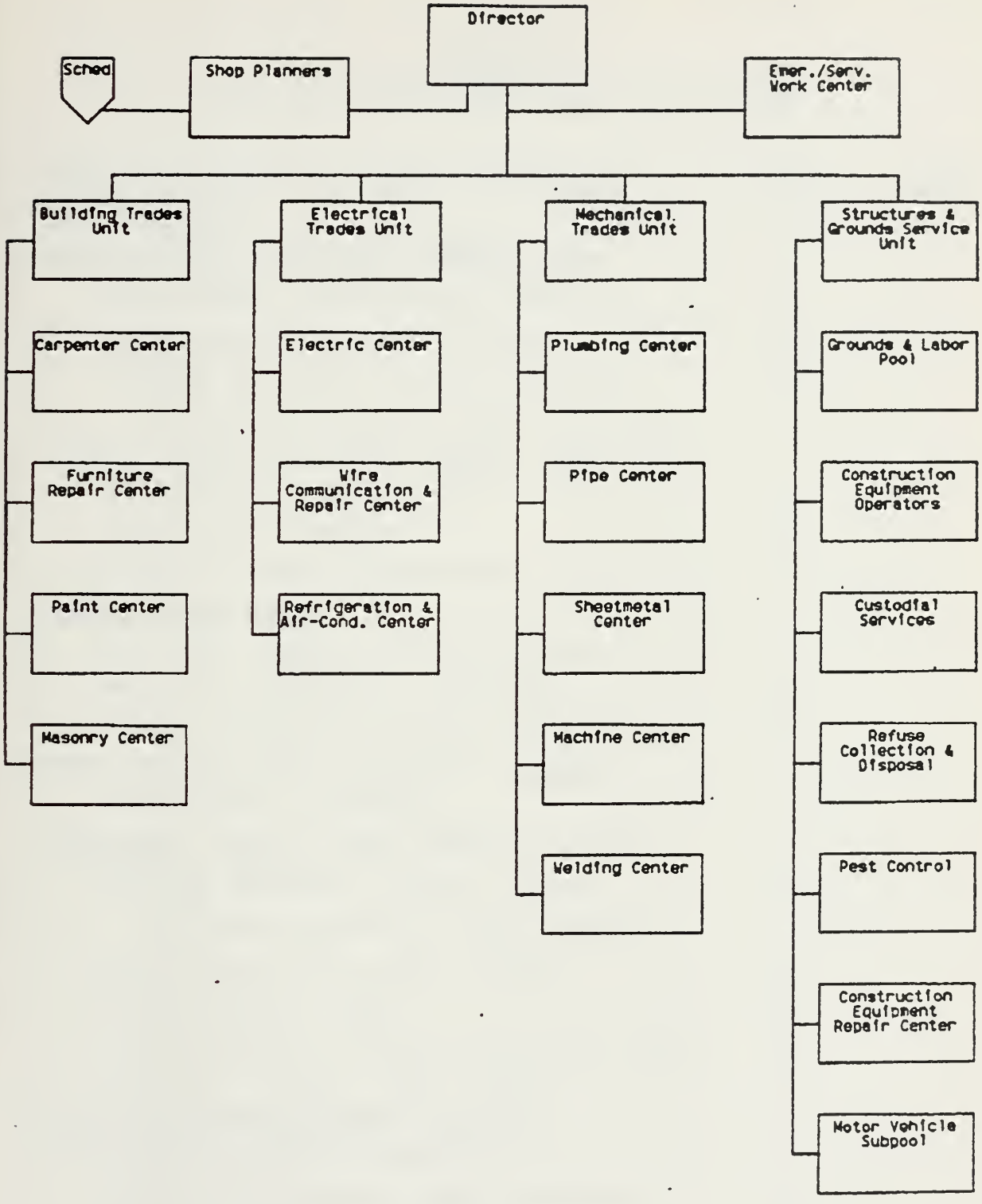

Figure B.6 Maintenance and Repair Division

APPENDIX C

LIST OF MARINE CORPS SHORE ACTIVITIES

Activity Mission and Chain of Command	Major	Minor
UNIT TRAINING		
Marine Corps Air Bases, Eastern Area		
MCAS Cherry Point, North Carolina	X	
MCAS Beaufort, South Carolina	X	
MCAS(H) New River, North Carolina (actually served by Camp Lejeune)	X	
Marine Corps Air Bases, Western Area		
MCAS El Toro, California	X	
MCAS Yuma, Arizona	X	
MCAS(H) Tustin, California	X	
Marine Corps Bases		
MCB Camp Lejeune, North Carolina	X	
MCB Camp Pendleton, California	X	
MCAGCC Twentynine Palms, California	X	
Fleet Marine Force Atlantic, Command		
Camp Elmore, Virginia		X
Commander, Marine Corps Bases, Pacific		
MCAS(H) Futenma, Okinawa, Japan (actually served by Camp Butler)	X	
MCAS Kaneohe Bay, Oahu, Hawaii	X	
MCAS Iwakuni, Japan	X	
Camp Smedley D. Butler, Okinawa, Japan	X	
Camp H.M. Smith, Oahu, Hawaii	X	
Recruit and Specialized Training		
MCDEC Quantico, Virginia	X	
MCRD Parris Island, South Carolina	X	
MCRD San Diego, California	X	

Activity Mission and Chain of Command	Major	Minor
CENTRALIZED SUPPLY AND MAINTENANCE		
MCLSELANT Albany, Georgia	X	
MCLSEPAC Barstow, California	X	
ADMINISTRATION		
MB 8th and I Streets, Washington, D.C.		X
HQ Bn, HQMC, Henderson Hall, Arlington, Virginia		X

APPENDIX A

SAMPLE FACILITIES MAINTENANCE FORMS

WORK REQUEST (MAINTENANCE MANAGEMENT)
NAVFAC 9-11014 (9) REV. 2-68) S/N 0105-LF-002-7510
Supersedes NAVDOCKS 2351

(PW Department see Instructions in NAVFAC MO 321)

Requestor see Instructions on Reverse Side

PART I—REQUEST (Filled out by Requestor)

1. FROM	2. REQUEST NO.
3. TO	4. DATE OF REQUEST
5. REQUEST FOR ☐ COST ESTIMATE ☐ PERFORMANCE OF WORK	5a. REQUEST WORK START
6. FOR FURTHER INFORMATION CALL	7. SKETCH/PLAN ATTACHED ☐ YES ☐ NO

8. DESCRIPTION OF WORK AND JUSTIFICATION *(Including location, type, size, quantity, etc.)*

9. FUNDS CHARGEABLE	10. SIGNATURE *(Requesting Official)*

PART II—COST ESTIMATE
(Filled out by Maintenance Control Division if estimate requested)

11. TO.	12. ESTIMATE NO.

13. COST ESTIMATE	
a. Labor	$
b. Material	$
c. Overhead and/or Surcharge	$
d. Equipment Rental/Usage	$
e. Contingency	$
f. TOTAL	$

14. SKETCH/PLAN ATTACHED ☐ YES ☐ NO

15.

☐ APPROVED. PROGRAMMING TO START IN _____

☐ APPROVED. BASED ON PRESENT WORKLOAD, THIS JOB CAN BE PROGRAMMED TO START IN _____ IF AUTHORIZED BY 25TH OF _____ AND FUNDS ARE MADE AVAILABLE.

☐ DISAPPROVED. *(See Reverse Side)*

16. SIGNATURE	17. DATE

PART III—ACTION (Filled out by Requestor)

18. TO.

19. AUTHORIZATION TO PROCEED IS ATTACHED *(Check one if other than PW funds are involved)* ☐ NAVCOMPT 140 ☐ OTHER	20. WORK REQUESTED ☐ HAS BEEN CANCELLED ☐ HAS BEEN DEFERRED ☐ WILL BE PERFORMED BY OTHERS
21. SIGNATURE	22. DATE

Figure D.1 NAVFAC 9-11014/20

TASK AREA: Framing, rough - doors, windows, joists, rafters, 12' walls; install, remove old and install new						CONTINUED ON NEXT PAGE
	DESCRIPTION	GROUP C CRAFT TIME .6hrs.	GROUP D CRAFT TIME 1.1hrs.	GROUP E CRAFT TIME 1.8hrs	GROUP F CRAFT TIME 2.9hrs	GROUP G CRAFT TIME 4.4hrs.
INSTALL	Foundation Wall Plates CT-156	15 - 30 ft.	31 - 53 ft.	54 - 83 ft.	84 - 136 ft.	137 - 197 ft.
	Floor Framing (Joists)					
	Cut in and frame opening in exterior wall for installation of A/C unit CT-159			1 opening framed		over 1 opening, use 2.163 hrs. each opening
	Rough framework for 12' high exterior walls					
	Window openings 3'4" by 6'2" (rough frame) CT-160	1 opening	2 openings	3 openings	4 - 5 openings	6 - 7 openings
	Window openings 3'6" by 6'0" in exterior walls (for double hung windows) CT-161					1 opening (cut in and rough frame)
	Window frames (double hung) in openings (includes sash with balances) CT-162			1 frame		2 frames
	Door openings (rough frame) for 2'8" by 6'8" door CT-163		1 opening	2 openings	3 - 4 openings	5 - 6 openings
	2" x 4" rafters (on one roof) (gable or shed type) CT-164	1 rafter	2 - 4 rafters	5 - 8 rafters	9 - 15 rafters	16 - 24 rafters
	2" x 6" rafters (on one roof) (gable or shed type) CT-165		1 - 3 rafters	4 - 8 rafters	9 - 15 rafters	16 - 23 rafters
REMOVE OLD AND INSTALL NEW	Laminated Sills					
	Rafters (shed type)		Two 2" x 6" x 12' rafters on shed type roof, CT-166	Five 2" x 6" x 12" rafters on shed type roof, CT-167		
TASK AREA: Framing, rough - doors, windows, joists, rafters, 12' walls; install, remove old and install new						

Figure D.2 Sample EPS Page.

WORK CENTER MASTER/DAY SCHEDULES

Week of _____

Workdays _____

Date Prepared _____

Sheet___of___

SECTION I: HOUR SUMMARY

PART A: LINE ITEM DATA Work Center Codes	PART B: MASTER WEEKLY SCHEDULE HOURS													Total	PART C: WC DAILY SKED. WCC___ Workdays/Hours					
															M	T	W	Th	F	Total
Total: Payroll Strength																				
Number Hours/Week																				
Less: Overhead (Leave)																				
Overhead (Supervision and Other)																				
Standing J.O.'s (03 & 04)																				
Service Work (02)																				
Scheduled Specific J.O.'s																				
Minor Work (Nonscheduled)																				

SECTION II: SCHEDULED J.O.'s

J.O. Ser. No.	Brief Job Title	Begin. / Comp.	HOURS												Total Job	This Week	To Date	Sked./Actual Hours					
	Subtotal: Scheduled J.O.'s																						

Figure D.3 Sample Master/Day Schedule Form (Front Side).

WORK CENTER MASTER/DAY SCHEDULES CONTINUATION SHEET

Week of _____ Date Prepared _____

Workdays _____

Sheet___of___

SECTION III: MINOR WORK AVAILABLE FOR WC SCHEDULING

PART A: LINE ITEM DATA			PART B: MASTER WEEKLY SCHEDULE															PART C: WC DAILY SKED. WCC					
			HOURS												Total Hours			Sked./Actual Hours					
J.O. Ser. No.	Brief Job Title	Begin. / Comp.													Total Job	This Week	To Date	M	T	W	Th	F	Total
	Subtotal: Minor Work Available																						
	Total: All Specifics Available																						

Figure D.4 Sample Master/Day Schedule Form (Back Side).

BMAR REPORT AND PROJECTS PLAN (8230)

NAVMC 11040 (REV. 1-80) *(Previous editions are obsolete and will not be used)*

SN 0000 00 886 0062 U/I: SH

REPORT CONTROL SYMBOL DN-11014-01

TO: COMMANDANT OF THE MARINE CORPS (CODE LFF)

1. FROM:

2. VIA:

All facilities inspected are in satisfactory condition except those shown on the BMAR Report.

3. DATE

4. SIGNATURE _____ BY DIRECTION

5. UIC

6. ACTIVITY

7. POINT OF CONTACT NAME: AUTOVON NO.

8. COPIES TO

9. FACILITIES NOT INSPECTED	10. REASON	11. DATE OF PREVIOUS INSPECTION	12. APPROXIMATE DATE OF NEXT INSPECTION
	SAMPLE		

13. FIRST ENDORSEMENT

DATE:

SIGNATURE _____

LINE NO	BASIC CONST. TYPE	WORK DESCRIPTION	DEF CODE	FAC NO.	DOD CAT CODE	COST ACCT CODE	PY	FY	FC/ BFC	FB-27 LINE NO.	VAL RATE	PROJECT NO.	POST CODE	COST
1 2 3	4	5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44	45	46 47 48 49 50 51	52 53 54	55 56 57 58	59	60	61 62	63 64 65 66	67 68 69	70 71 72 73	74 75	76 77 78 79 80
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														
13														
14														
15														

Figure D.5 NAVMC Form 11040

EMERGENCY/SERVICE WORK AUTHORIZATION

NAVFAC 11014/21 (Rev. 6-75)

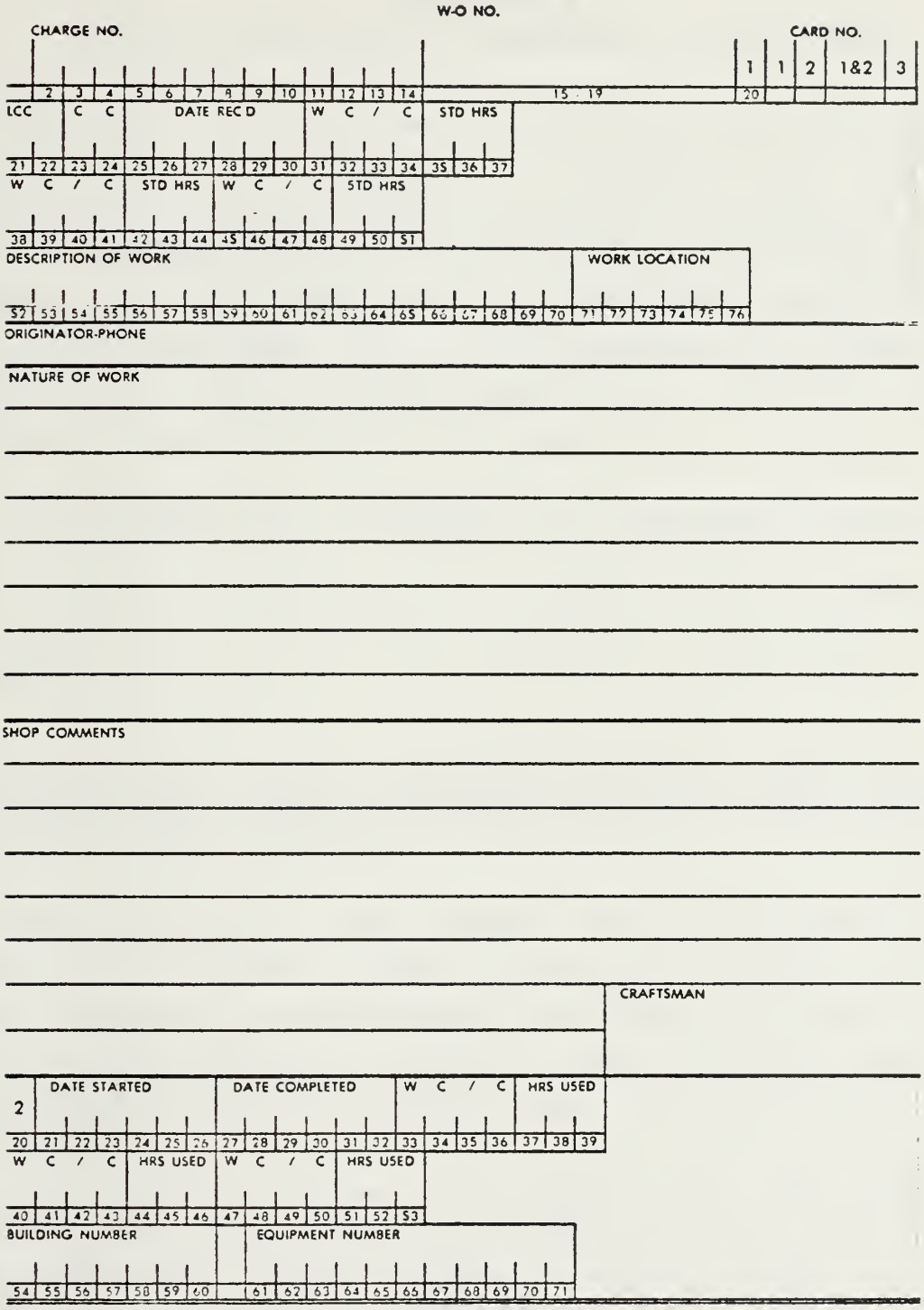

Figure D.6 E/S Ticket

APPENDIX E

FACILITIES MAINTENANCE MANAGEMENT SYSTEM (FMMR)

The FMMR is a subsystem of the PRIME system discussed in Chapter VI. Its purpose is to provide the Facilities Maintenance Officer with an analysis of perfcmance criteria in a meaningful format. This should permit correction of deficiencies and thus lead to an efficient management of funds and resources. The FMMR automatically produces four reports by drawing on PRIME system data. These are used to manually prepare two cther reports.

A. FMMR REPORT NO. 1: ESTIMATE AND PERFORMANCE ANALYSIS

Figure E.1 shows a sample of Report No. 1. As described on page C-12 of MCO P11000.7 [Ref. 7], the purpose of this report is:

> To summarize monthly comparative data of estimated and actual hours, labcr, material, and equipment, and to identify the degree of EPS utilization by work centers for the mcnth covered.

The scurces for this report are the data on "closed specific job orders, labor distribution cards, material issue vouchers and ccnstruction equipment and motor vehicle utilizaticn records". [Ref. 7] This data is summarized monthly fcr all closed specific JO's up to the day of repcrt generaticn.

The report provides this summary data for each work center within the Facilities Maintenance Department. The "material ccst" column compares estimated costs to actual costs and shows a resulting percent ratio. The "labor cost" column has the total actual costs expended by that work

center on closed specific JO's. The "EPS" and "non-EPS" columns show the number of estimated hours for these JO's using either EPS estimates or some other estimating methods. The "M/L ratio" column shows the ratio of material to labor. The "% EPS utilization" column is the result of a contorted computation:

> The entries are derived by dividing the number of hours EPS-estimated by the product obtained as follows: add the number of hours EPS-estimated with the number of hours non-EPS-estimated, and multiply the sum by 60 percent and the result by 100. The 60 percent factor represents the average 80 percent of total work accomplished for which EPS's are available and 75 percent of the specific jobs estimated [Ref. 7 : p. C-12].

The last column, "project to date" shows the accumulated actual material and labor costs for the fiscal year and the total material to labor ratio.

B. FMMR REPORT NO. 2: LABOR ANALYSIS

Figure E.2 shows a sample of this report. Its purpose is:

> To summarize separately hours expended on productive work accomplished by each work center in the 30, 40, 50, 60, and 70 (less WCC 77) code series and to summarize that data collectively for all work centers. The hour data by work generator codes provides a means of evaluating the level work control for the month covered [Ref. 7 : p. C-16].

Work center codes 30 through 70 refer to the M&R Division's various trade units. The labor generated by these units is identified with the work generator code (labor class code) to show what types of effort that labor was applied to: emergency work, standing JO's, supervision, administrative/clerical, etc. The report compares labor for actual production (i.e. labor spent actually repairing and maintaining) to labor spent in overhead tasks such as supervision and clerical work.

The report has a column showing monthly manhour totals for productive and overhead level and the relative percentages of each of these same figures totaled for the fiscal year to date.

C. FMMR REPORT NO. 3: COMPLETED SPECIFIC JOB ORDERS

Report No. 3 (Figure E.3) is frequently referred to as the "Variance Report". It was discussed in Chapter III as the vehicle which prompts the local variance reports to be prepared on variances plus or minus 10%. This prompts the meeting of the Variance Review Committee. The purpose of the report is:

> To provide summary estimated and actual data for each closed specific job order to detect the adequacy or accuracy of EPS's, and to review the performance of the planners/estimators and the work centers involved in estimating and accomplishing the job. Variations in estimated versus actual labor costs may indicate a need to adjust wage rates applied by the planner/estimators [Ref. 7 : p. C-18].

The report identifies the data by Job Orders grouped together by Work Center. It shows estimated and actual manhours, labor costs and material costs and the percentages of actual to estimated for each. It then totals the cost for labor and material. These costs apply after the JO has been closed, all invoices have been paid and the PRIME system closeout actions have been taken.

D. FMMR REPORT NO. 4: STANDING JOB ORDER STATUS

This report (Figure E.4) provides variances on labor and material for all standing JO's. Its purpose is:

> To determine the status of standing job orders with respect to hours and cost expended in relation to the estimated or control levels for the fiscal year. The report provides record data to:

a. Control expenditures for all standing job orders, both estimated and unestimated
b. Evaluate the performance of planners/estimators and productive personnel related to work authorized by standing job orders.
c. Plan budgetary requirements for recurrent work, the scope and frequency of which cannot be determined.
d. Determine material/labor ratios for justifying budgets and programming work [Ref. 7 : p. C-20].

The report lists JO's by Work Center. It shows the actual labor and material costs, the manhours, and the material to labor ratio for the reporting period. This data is summarized in a "fiscal-year-to-date" column listing estimated costs and actual costs for labor and material with an actual to estimated percentage ratio. It also summarizes the estimated and actual material to labor ratios.

E. FMMR REPORT NO. 5: WORK STATUS

This report (Figure E.5) is often referred to as the "backlog report". Its purpose is:

> To evaluate personnel and work data in relation to the volume of work planned and accomplished, and to gage balanced work forces for projected workloads of quarterly work programs [Ref. 7 : p. C-24)].

In essence, this report reflects how well the Department is following the "Primary Maintenance Policy" discussed in Chapter IV. The SRMP has identified what projects should be accomplished. This should allow projection of required work force sizes. The report then portrays the unplanned work which has affected performance of the SRMP.

Report No. 5 is prepared manually. As sources of data it uses personnel records, the quarterly work schedule, Reports No. 1 and 4, inspection reports, and master schedules. Part one of the report records the number of personnel assignments for standing JC's (overhead and productive), unscheduled work and scheduled specific JO's. This is compared to

the total personnel available. It then records work available for specific JO's with material, without material, without completed P&E work, and total for all categories. This part is prepared monthly.

Part two is accomplished quarterly. It records the total number of minor and specific jobs in the quarterly work program at the beginning of the period and at the end. It also records the total number of these types of jobs together with others that were completed but not in the quarterly work program. This attempts to provide an indication of progress made to reduce the number of jobs on the SRMP.

F. FMMR REPORT NO. 6: EFFECTIVENESS RATING

Report No. 6 (Figure E.6) is also manually prepared once a month. Its purpose is:

> To standardize a method of developing a numerical rating for the primary elements applicable to facilities maintenance management. A judicious evaluation of data compiled from the reports will enable local management to appraise accomplishments of overall facilities maintenance operations and improve their effectiveness.... [Ref. 7 : p. C-28].

This report is to be submitted to HQMC. It is thus an effectiveness indicator at both the local level and at Headquarters. Each element of figure E.6 has an equation using certain data to arrive at a point value for that element. These are totaled to provide scores in each of the four categories: Work Generation Control; Work Control; Hour Control; and Planning Control. Figure E.6 shows the optimum scores for these categories and the desired percentages to attain. This is reflective of the "Primary Maintenance Policy" to generate work from the SRMP and LRMP rather than E/S and unscheduled work. It also reports other desirable management indicators such as EPS use and variance control.

PAGE 1 PROGRAM C7311c61 ESTIMATE AND PERFORMANCE ANALYSIS REPORT PERIOD ENDING 22 MAR 1975

WC CODE	WC TITLE		MATERIAL COST	LABOR COST	MAN HOURS EPS	MAN HOURS NON-EPS	M/L RATIO	% EPS UTILIZA	PROJECT TO DATE	
		EST	0.00		0.0	0.0			ACT MATRL COST	9709.87
41	CARPENTER	ACT	9709.87	10561.33	0.0	1398.0			ACT LABOR COST	10561.33
		% EST/ACT	0%		0%	0%	.91	0%	M/L RATIO	.91
		EST	0.00		0.0	0.0			ACT MATRL COST	3657.81
43	PAINT	ACT	3657.81	18854.70	0.0	2435.0			ACT LABOR COST	18854.70
		% EST/ACT	0%		0%	0%	.19	0%	M/L RATIO	.19
		EST	0.00		0.0	0.0			ACT MATRL COST	13367.68
	SUBDIVISION TOTAL	ACT	13367.68	29416.03	0.0	3833.0			ACT LABOR COST	29416.03
		% EST/ACT	0%		0%	0%	.45	0%	M/L RATIO	.45
		EST	0.00		0.0	0.0			ACT MATRL COST	6505.99
51	ELECTRIC	ACT	6505.99	1763.16	0.0	215.3			ACT LABOR COST	1763.16
		% EST/ACT	0%		0%	0%	3.68	0%	M/L RATIO	3.68
		EST	0.00		0.0	0.0			ACT MATRL COST	250.61
53	REFRIG & AIR COND	ACT	250.61	1412.35	0.0	172.0			ACT LABOR COST	1412.35
		% EST/ACT	0%		0%	0%	.17	0%	M/L RATIO	.17
		EST	0.00		0.0	0.0			ACT MATRL COST	6756.60
	SUBDIVISION TOTAL	ACT	6756.60	3175.51	0.0	387.3			ACT LABOR COST	3175.51
		% EST/ACT	0%		0%	0%	2.12	0%	M/L RATIO	2.12
		EST	0.00		0.0	0.0			ACT MATRL COST	3638.58
61	PLUMBING	ACT	3638.58	5379.15	0.0	792.0			ACT LABOR COST	5379.15
		% EST/ACT	0%		0%	0%	.67	0%	M/L RATIO	.67
		EST	0.00		0.0	0.0			ACT MATRL COST	16997.08
63	SHEET METAL	ACT	16997.08	2520.15	0.0	415.0			ACT LABOR COST	2520.15
		% EST/ACT	0%		0%	0%	6.74	0%	M/L RATIO	6.74

Figure E.1 FMMR Report No. 1: Estimate and Performance Analysis

PAGE 2 LABOR ANALYSIS/WORK CENTER SUMMARY 32 PROGRAM C7300631 PERIOD ENDING 22 MAR 1975

		MAN-HOURS		FISCAL YTD MAN-HOURS	
WGC	WGC TITLE/DESCRIPTION	PRODUCTIVE OVERHEAD	PRODUCTIVE OVERHEAD %	PRODUCTIVE OVERHEAD	PRODUCTIVE OVERHEAD %
01	EMERGENCY WORK	42.0	10.0	42.0	10.0
02	SERVICE WORK	355.0	88.0	355.0	88.0
03	STANDING JO-S NOT ESTIM.				
04	STANDING JO-S ESTIM.				
05	SPECIFIC JO-S	8.0	2.0	8.0	2.0
*	TOTAL PRODUCTIVE	405.0	100.0	405.0	100.0
10	SHOP SUPERVISION				
11	ADMINISTRATIVE/CLERICAL				
12	INDIRECT SUPPORT				
13	LEAVE				
14	ALLOWED TIME				
*	TOTAL OVERHEAD				
**	GRAND TOTAL	405.0	100.0	405.0	100.0

Figure E.2 FMMR Report No. 2: Labor Analysis

PAGE 0001 PROGRAM C7300651 COMPLETED SPECIFIC JOB ORDERS PERIOD ENDING 22 MAR 1975

JOB ORDER	EST JOB CODE	TITLE	WC CODE		MAN HOURS	LABOR COST	MATERIAL COST	TOTAL COST
A52080								
				EST	.0	.00	.00	.00
				ACTUAL	8.0	62.28	.00	62.28
			41	% ACT/EST	0%	0%	0%	0%
				EST	.0	.00	.00	.00
				ACTUAL	8.0	62.28	.00	62.28
SUBTOTAL				% ACT/EST	0%	0%	0%	0%
				EST				.00
				ACTUAL				62.28
TOTAL				% ACT/EST				0%

Figure E.3 FMMR Report No. 3: Completed Specific Job Orders

PAGE 1 PROGRAM C730C641

STANDING JOB ORDER STATUS

PERIOD ENDING 22 MAR 1975

REPORTING PERIOD (ACTUAL)

JOB SER	WC CODE	ACTUAL	LABOR	MATERIAL	TOTAL
A2P430	51	COST	.00	.00	.00
		MAN HOURS	.00		
		M/L RATIO	.00		
TOTAL		COST	.00	.00	.00
		MAN HOURS	.00		
		M/L RATIO	.00		

FISCAL YEAR-TO-DATE (EST/ACT)

	MATERIAL	LABOR	M/L RATIO EST	M/L RATIO ACT
ESTIMATE	.00	.00		
ACTUAL	.00	.00	.00	.00
% ACT/EST	00%	00%		
ESTIMATE	.00	.00		
ACTUAL	.00	.00	.00	.00
% ACT/EST	00%	00%		

Figure E.4 FMMR Report No. 4: Standing Job Order Status.

PART I:

PERIOD ENDING:

WORK CENTER		NUMBER OF PERSONNEL ASSIGNMENTS					WORK AVAILABLE (SPECIFIC JOBS) SHOP DAYS				
CODE NO. (1)	TITLE (2)	ON BOARD (3)	STANDING JO'S OVERHEAD (4)	STANDING JO'S PRODUCTIVE (5)	UNSKED WORK (6)	SKED SPECIFIC (7)	WITH MAT'L (8)	WITHOUT MAT'L (9)	PRELIMINARY ESTIMATE (10)	TOTAL (11)	HOURS TOTAL (12)
TOTAL:											

PART II:

1. Number of specific and minor jobs on quarterly program _____.
2. Number of minor and specific jobs completed this period from the program _____.
3. Total number of minor and specific jobs completed this period _____.

Figure E.5 FMMR Report No. 5: Work Status.

Period: Oct - Dec 1980

Category (1)		Elements (2)	Computed Rating % (3)	Desired Range % (4)	Maximum Points (5)	Attained Points (6)
1	Work Generation Control	1. Program Effectiveness		70-100	10	
		2. Inspection Effectiveness		100	6	
		3. Standing Job Order Control		100	6	
		4. Accounting Data Accuracy		100	4	
		5. Emergency Work		1.5	1	
		6. Service Work		15	3	
		7. Work Centers With 15 - 35 Days of Work		80	2	
		8. Emergency/Service Work Identification		100	2	
		9. Total Work Generation Control			34	
2.	Work Control	10. Productive Hour Control		80	6	
		11. Productive Hours to Total		55-100	5	
		12. Performance Labor		90-110	5	
		13. Performance Material		98-102	2	
		14. EPS Utilization		80-100	10	
		15. % Variations Investigated		100	5	
		16. BMAR Accuracy		90-100	5	
		17. Total Work Control			38	
3.	Hour Control	18. Supervisory to Total Hours		6-7	3	
		19. Misc. Indirect to Total Hours		7	4	
		20. Total Hour Control			7	
4.	Planning Control	21. Personnel Accounted for on Schedule Sheet		100	3	
		22. Work Center Schedule Preplanning		75-100	3	
		23. Shop Planning Effectiveness		90-100	5	
		24. Schedule Effectiveness		95-100	5	
		25. % E/S Work Accomplished by E/S WC		65	5	
		26. Total Planning Control			21	
		27. Total Control			100	

Figure E.6 FMMR Report No. 6: Effectiveness Rating

APPENDIX F

BASE ENGINEERING SUPPORT, TECHNICAL (BEST) SYSTEM

The BEST system is a facilities maintenance management system under development by the Navy. It is intended to consolidate fiscal, supply and facilities maintenance data collection in a way that ensures interfacing in all three areas. The system is being developed by NAVFACENGCOM for use on Wang or Wang-compatible hardware. It is designed to use a mini-computer with remote (intra-Department) terminals. Emphasis has been on user-friendly, menu-driven interaction.

BEST has three independent subsystems which are each designed for their own suite of equipment [Ref. 35]. The subsystems comprise seven modules:

I. Maintenance/Utilities Subsystem
   A. Facilities Maintenance System composed of:
      1. Facilities Engineering Job Estimating (FEJE) Module
      2. Work Input Control (WIC) Module
      3. Emergency/Service (E/S) Module
      4. Shore Facilities Inspection (SFI) Module
   B. Utilities Module

II. Family Housing Subsystem

III. Transportation Subsystem

The Transportation Subsystem will assist in managing the installation's motor transport vehicle pool. In the Navy, this is one of the Public Works Officer's functions. The Housing Subsystem is designed to help the Housing Officer control assignments and terminations. At Marine Corps installations the motor transport tasks are managed by the Base Motor Transport Department. The housing tasks (except maintenance) are usually handled by a separate Housing

Office. These organizations are FA's normally outside the Facilities Maintenance Department. Therefore, while these two subsystems may help those FA's, they are not wholly applicable to the Facilities Maintenance Department as defined in this study.

The modules of the Maintenance/Utilities Subsystem address most of the direct concerns of the Department. A brief description follows.

A. THE FEJE MODULE

This module uses EPS standards to estimate labor; has the capacity to provide material estimates and non-EPS estimates; will provide hardcopy printouts of forms and records; and will assist in phasing and scheduling of jobs. It is composed of three main sections:

1. EPS Job Directory

This is a listing of all currently active or completed jobs. From this directory the user can enter and print a Job Authorization Form, add/delete jobs, display and modify jobs, print the Directory or proceed to other sections.

2. Job Setup

This section is used for detailed estimation. It performs job phasing and work center tasking. The user can interact with the Craft Handbook section after each entry, access the time standards and create, modify or delete estimates. As this is done, the system updates labor hour totals and costs for each work center. It also prepares estimates for "overhead" labor costs such as travel time or supervision. Material estimating can be added. When the user is finished, a hardcopy printout can be provided.

3. Craft Handbocks

This section has all 13 Craft Handbooks for EPS estimating. The user selects the one desired from a list, views a table of ccntents, chooses a task area and is presented the proper spreadsheet. This provides the estimates needed for the Job Setup section. It has the capability tc store local estimates if they differ from the DOD standards and to store non-EPS estimates. [Ref. 36]

B. THE WIC MODULE

This mcdule can add, delete and retrieve history and status information cn jobs in the Department. It will display a current jcbs list by facility number or specific jobs with their requisite information. It will perform the same functions fcr ccntracts. It then permits modificaticns to the records recalled.

The main mcdule includes a standard reports mcdule allowing display and printing of reports such as annual inspectien summaries, backlogs (by work center or customer), variances and lists of job types (i.e. maintenance, repair, minor ccnstruction, etc.). The WIC also has modules which provide infcrmation cn manpower availability and resource utilization. It can provide historical data on completed jobs and contracts, shop load planning information and projected contract load plans. [Ref. 37]

C. THE E/S MODULE

The E/S module helps tc manage the E/S input and work load. It provides active and historical Work Center Directories. These keep track of old E/S tickets and allow entry of new ones. A report generator permits summarization and examination cf the data on the files in varying formats

including the status of a given job. A selection of standard reports is also included. [Ref. 38]

D. THE SFI MODULE

This module is currently in an early development stage. As conceived, it will provide a means to implement controlled inspection of facilities and recurring maintenance of plant equipment. The user will load a complete inventory of equipment and facilities with their associated inspection frequency. The module will then generate a schedule for inspection of these items. The FEJE module would be used to provide labor estimates for this work. Then the SFI module provides the associated workload figures. From this the manager can compare the available labor for this workload and make decisions on which parts to contract out. The module will provide schedules for one year in either one month or four week increments based on the shop plans. It has the potential for modification to allow the inclusion of almost any recurring work. [Ref. 39]

E. THE UTILITIES MODULE

This module is also in early stages of development. When completed, it will be able to generate the DOD energy reports using the base's utility consumption information. The module will maintain customer records for the various base tenants showing their energy consumption by facility and in total. The module will track all energy purchases and consumption as well as base-generated energy.

APPENDIX G
ALPHABETIC GLOSSARY OF ACRONYMS

ADP	Automated Data Processing (Ch. I, p. 13)
BEAM	Base Engineer Automated Management System (Ch. VIII, p. 78)
BEST	Base Engineering Support, Technical (Appen. F, p. 132)
BOM	Bill of Materials (Ch. III, p. 27)
BMAR	Backlog of Maintenance and Repair (Ch. IV, p. 44)
CAC	Cost Account Code (Ch. III, p. 29)
CERPS	Navy Register/System Centralized Expenditure Reimbursement System (Appen. A, p. 105)
CRT	Cathode Ray Tube (Appen. A, p. 106)
DBMS	Data Base Management System (Ch. VIII, p. 31)
EE	Element of Expense (Ch. III, p. 29)
EPS	Engineering Performance Standards (Ch. III, p. 27)
E/S	Emergency/Service (Ch. V, p. 52)
FA	Fund Administrator (Ch. I, p. 11)
FCC	Functional Category Code (Ch. III, p. 29)
FEJE	Facilities Engineering Job Estimating (Appen. F, p. 133)
FMMR	Facilities Maintenance Management Reporting System (Ch. VIII, p. 70; Appen. E, p. 121)
HQMC	Headquarters Marine Corps (Ch. IV, p. 44)
IDA	Integrated Disbursing and Acccunting System (Appen. A, p. 105)
JO(N)	Job Order (Number) (Ch. III, p. 29)
JUMPS	Joint Uniform Military Pay System (Ch. I, p. 12)
LRMP	Long Range Maintenance Plan (Ch. IV, p. 41)
M3S	Marine Corps Standard Supply System (Ch. I, p. 12)
MAGFARS	Marine Air/Ground Financial Accounting and Reporting System (Appen. A, p. 105)

M&R	Maintenance and Repair Division (Ch. III, p. 34)
MJON	Master Job Order Number Report (Ch. III, p. 36)
MCDN	Marine Corps Data Network (Appen. A, p. 105)
NAVFACEC	Navy Facilities Engineering Command (Ch. III, p. 27)
O&M,MC	Operations and Maintenance, Marine Corps (Ch. I, p. 11)
OMB	Office of Management and Budget (Ch. VII, p. 66)
P&E	Planning and Estimating Unit (Ch. III, p. 26)
P&P	Plans and Programs Unit (Ch. III, p. 26)
PECI	Productivity Enhancement Capital Investment (Ch. VIII, p. 78)
POL	Petroleum, Oil, Lubricants (Ch. VI, p. 65)
PPBS	Planning, Programming and Budgeting System (Ch. VI, p. 64)
PRIME	Priority Management Efforts System (Ch. VI, p. 58)
RASC	Regional Automated Services Center (Appen. A, p. 105)
RDD	Required Delivery Date (Ch. III, p. 32)
RMS	Resources Management System (Ch. VI, p. 58)
SABRS	Standard Accounting, Budgeting and Reporting System (Ch. I, p. 12; Appen. A, p. 105)
SASSY	Supported Activities Supply System (Ch. I, p. 12)
SECDEF	Secretary of Defense (Ch. VI, p. 58)
SFI	Shore Facility Inspection (Appen. F, p. 135)
SRMP	Short Range Maintenance Plan (Ch. IV, p. 41)
T/O	Table of Organization (Ch. V, p. 57)
WCC	Work Center Code (Ch. III, p. 30)
WIC	Work Input Control (Appen. F, p. 134)

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